

# Package / Module / PC Card Outlines and Dimensions

## Intel Product Identification Codes

NG

8 0 3 8 6 S X 1 6

S X 3 8 7

Up to 15 Alphanumeric Characters  
For Device Types

Up to 6 Alphanumeric Characters  
to Show Customer-Specific  
Requirements

### Package Type

A	–	Ceramic Pin Grid Array
B	–	Ceramic Land Grid Array
C	–	Ceramic Dual In-Line Package
D	–	Cerdip Dual In-Line Package
DP	–	Cerdip Dual In-Line Package, 300 MIL
E	–	Thin Small Out-Line Package, Die Up
F	–	Thin Small Out-Line Package, Die Down
FP	–	Plastic Flatpack Package
FW	–	Plastic Ball Grid Array Die Up 1.27 mm Solder Ball Pitch
FV	–	Plastic Pin Grid Array, Cavity Down, Staggered Pin
G	–	Micro Ball Grid Array
GB	–	Single In-Line Leaded Memory Module
GC	–	HL-PBGA-Thermally Enhanced, Plastic Ball Grid Array
K	–	Ceramic Pin Grid Array
KA	–	Ceramic Pin Grid Array, Dual Cavity, Die Down
KD	–	Plastic Quad Flatpack Package, Fine Pitch, Die Down
KU	–	Plastic Quad Flatpack Package, Fine Pitch, Die Up
N	–	Plastic Leaded Chip Carrier
NG	–	Plastic Quad Flatpack, Fine Pitch, Die Down with Heat Spreader
P	–	Plastic Dual In-Line Package
PA	–	Small Out-Line "Gull-Wing" Package
PD	–	Plastic Dual In-Line Package, 300 MIL
PE	–	Small Out-Line "J"-Lead Package
Q	–	Ceramic Quad Flatpack Package
R	–	Ceramic Leadless Chip Carrier
S	–	Quad Flatpack Package
SB	–	Shrink Quad Flatpack Package
SM	–	Single In-Line Leadless Memory Module
U	–	Plastic Dual In-Line Package, Shrink Dip
X	–	Unpackaged Devices

A	–	Indicates automotive operating temperature range.
I	–	Indicates industrial grade.
L	–	Indicates extended operating temperature range (-40°C to +85°C) express product with 160 ± 8 hrs. dynamic burn-in.
Q	–	Indicates commercial temperature range (0°C to +70°C) express product with 160 ± 8 hrs. dynamic burn-in.
T	–	Indicates extended temperature range (-40°C to +85°C) express product without burn-in.

A5581-02

A5581-02

## 2.1 Ceramic Side Braze Dual In-line Package

### 2.1.1 Symbol List for Ceramic Side Braze Dual In-Line Family

Letter or Symbol	Description of Dimensions
$\alpha$	Angular spacing between minimum and maximum lead positions measured at the gauge plane
A	Distance from seating plane to highest point of body (lid)
A <sub>1</sub>	Distance between seating plane and base plane
A <sub>2</sub>	Distance from base plane to highest point of body (lid)
A <sub>3</sub>	Base body thickness
B	Width of terminal leads
B <sub>1</sub>	Width of terminal lead shoulder which locates seating plane (standoff geometry optional)
C	Thickness of terminal leads
D	Largest overall package dimension of length
D <sub>2</sub>	A body length dimension, end lead center to end lead center
E	Largest overall package width dimension outside of lead
E <sub>1</sub>	Body width dimensions not including leads
e <sub>1</sub>	Linear spacing between centerlines of body standoffs (terminal leads)
e <sub>A</sub>	Linear spacing of true minimum lead position center line to center line
e <sub>B</sub>	Linear spacing between true lead position outside of lead to outside of lead
L	Distance from seating plane to end of lead
N	The total number of potentially usable lead positions
S	Distance from true position centerline of No. 1 lead position to the extremity of the body
S <sub>1</sub>	Distance from outer end lead edge positions to the extremity of the body

**NOTES:**

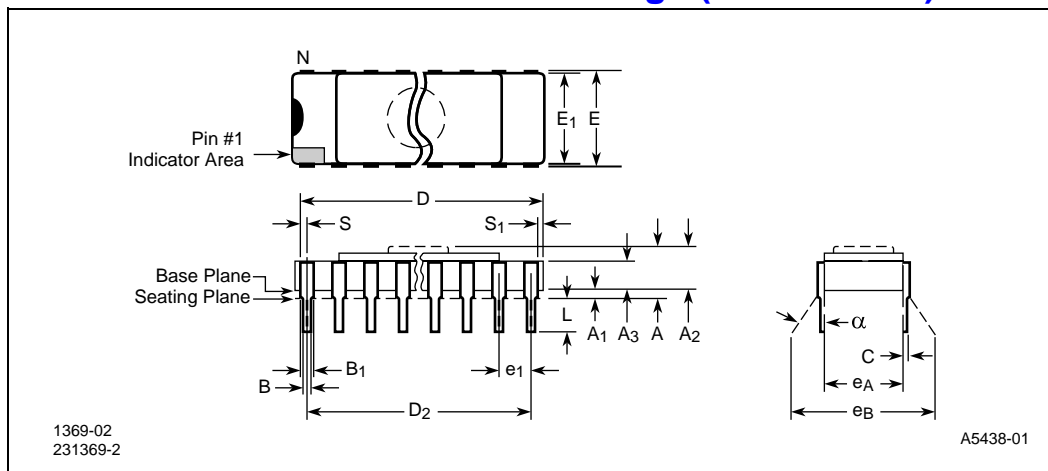
1. Controlling dimension: millimeter.
2. Dimension "e<sub>1</sub>" ("e") is non-cumulative.
3. Seating plane (standoff) is defined by P. C. board hole size: 0.0415-0.0430 inch.

Packaging Family Attributes	
<b>Category</b>	<b>Ceramic Dual-In-Line</b>
Acronym	C-DIP or Side Brazed
Lead Configuration	Sidebrazed
Lead Counts	40
Lead Finish	Gold Plate / Solder Coat
Lead Pitch	0.100"
Board Assembly Type	Socket and Insertion Mount

**NOTES:**

1. Alloy 42 or Kovar leads.
2. Multilayer Co-Fired Ceramic Body.

## 2.1.2 40 Lead Ceramic Dual In-Line Package (Side Brazed)



Family: Ceramic Side Braze Dual In-Line						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
$\alpha$	0°	10°		0°	10°	
A	3.30	5.51	Solid Lid	0.130	0.217	Solid Lid
A	4.04	6.58	EPROM Lid	0.159	0.259	EPROM Lid
A <sub>1</sub>	1.02	1.52		0.040	0.060	
A <sub>2</sub>	2.29	3.99	Solid Lid	0.090	0.157	Solid Lid
A <sub>2</sub>	3.02	4.88	EPROM Lid	0.119	0.190	EPROM Lid
A <sub>3</sub>	2.03	3.66		0.080	0.144	
B	0.38	0.56		0.015	0.022	
B <sub>1</sub>	1.27		Typical	0.050		Typical
C	0.23	0.30	Typical	0.009	0.012	Typical
D	50.29	51.31		1.980	2.020	
D <sub>2</sub>	48.26		Reference	1.900		Reference
E	15.24	15.75		0.600	0.620	
E <sub>1</sub>	14.86	15.37		0.585	0.605	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
e <sub>A</sub>	14.99		Reference	0.590		Reference
e <sub>B</sub>	15.24	17.15		0.600	0.675	
L	3.18	4.06		0.125	0.160	
N	40			40		
S	0.76	1.78		0.030	0.070	
S <sub>1</sub>	0.13			0.005		

## 2.2 Ceramic Leadless Chip Carrier

### 2.2.1 Symbol List for Ceramic Leadless Chip Carrier Family

Letter or Symbol	Description of Dimensions
A	Thickness of body
A <sub>1</sub>	Total package height
A <sub>2</sub>	Distance from top of base to highest point of body lid
B	Width of terminal lead pin
D	Largest overall package dimension of length
D <sub>1</sub> , E <sub>1</sub>	A body length dimension, corner cutout to corner cutout or end lead center to end lead center
D <sub>2</sub> , E <sub>2</sub>	A body length dimension, end lead center to end lead center
D <sub>3</sub> , E <sub>3</sub>	A body length dimension, corner cutout to index corner cutout
D <sub>4</sub> , E <sub>4</sub>	Ceramic body fixture
E	Largest overall package dimension of width
e	Linear spacing
e <sub>1</sub>	Linear spacing between edges of true lead positions (corner terminal lead pads) lead corner to lead corner
h	Depth of major index feature
j	Width of minor index feature
L	Distance from package edge to end of effective pad
N	The total number of potentially usable lead positions
R <sub>1</sub>	Inner notch radius

**NOTES:**

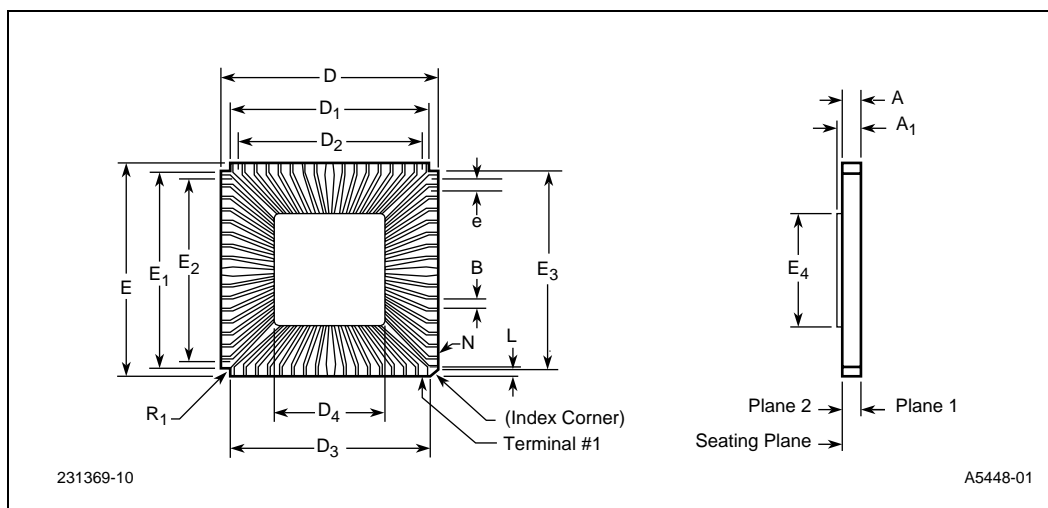
1. Controlling dimension: millimeter.
2. Dimension "e<sub>1</sub>" ("e") is non-cumulative.
3. Seating plane (standoff) is defined by P. C. board hole size: 0.0415-0.0430 inch.
4. Dimensions "B", "B<sub>1</sub>", and "C" are nominal.
5. Corner configuration optional.

Packaging Family Attributes	
Category	Ceramic Leadless Chip Carrier
Acronym	LCC
Lead Configuration	N/A
Lead Counts	68
Lead Finish	Gold Plate
Lead Pitch	0.050"
Board Assembly Type	Socket

**NOTES:**

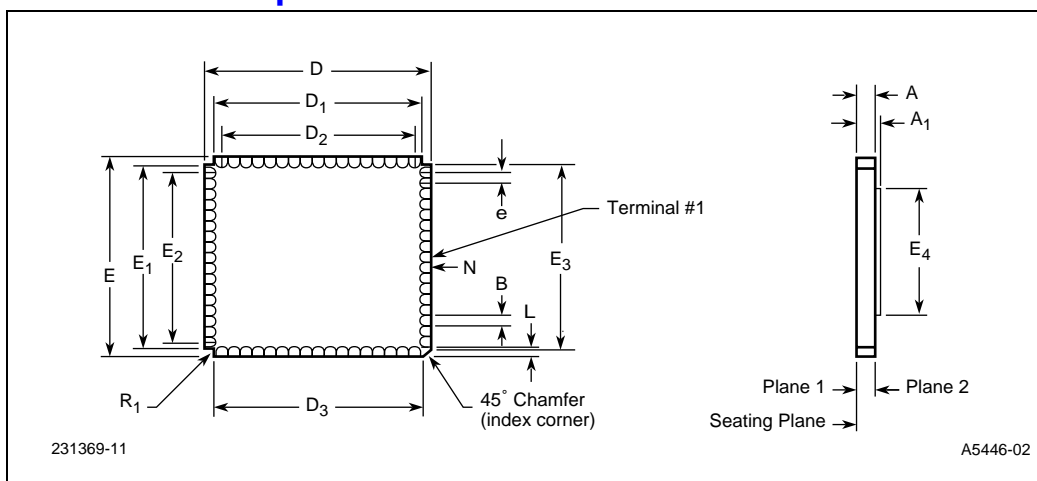
1. 68L not certified for Surface Mount. Must be socketed.
2. Multilayer Co-Fired Ceramic Body.

## 2.2.2 68 Ceramic Leadless Chip Carrier Variation: Die Down



Family: Ceramic Leadless Chip Carrier						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	1.37	1.68		0.054	0.066	
A <sub>1</sub>	2.16	2.72		0.085	0.107	
B	0.84	0.99	Typical	0.033	0.039	Typical
D	23.88	24.38		0.940	0.960	
D <sub>1</sub>	21.39	21.39		0.842	0.858	
D <sub>2</sub>	20.32		Reference	0.800		Reference
D <sub>3</sub>	21.92		Reference	0.863		Reference
D <sub>4</sub>	16.76	17.27		0.660	0.680	
E	23.88	24.38		0.940	0.960	
E <sub>1</sub>	21.39	21.79		0.842	0.858	
E <sub>2</sub>	20.32		Reference	0.800		Reference
E <sub>3</sub>	21.92		Reference	0.863		Reference
E <sub>4</sub>	16.76	17.27		0.660	0.680	
e	1.04	1.50	Typical	0.041	0.059	Typical
L	0.94			0.037		
N	68			68		
R <sub>1</sub>		0.25			0.010	

### 2.2.3 68 Ceramic Leadless Chip Carrier Variation: Die Up



Family: Ceramic Leadless Chip Carrier						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	1.91	2.41		0.075	0.095	
A <sub>1</sub>	2.92	3.68	W/EPROM	0.115	0.145	W/EPROM
B	0.84	1.12		0.033	0.044	
D	23.88	24.38		0.940	0.960	
D <sub>1</sub>	21.39	21.79		0.842	0.858	
D <sub>2</sub>	20.32		Reference	0.800		Reference
D <sub>3</sub>	22.05		Reference	0.868		Reference
E	23.88	24.38		0.940	0.960	
E <sub>1</sub>	21.39	21.79		0.842	0.858	
E <sub>2</sub>	20.32		Reference	0.800		Reference
E <sub>3</sub>	22.05		Reference	0.868		Reference
E <sub>4</sub>	14.33	15.14		0.564	0.596	
e	1.04	1.50	Typical	0.041	0.059	Typical
L	1.27			0.050		
N	68			68		
R <sub>1</sub>		0.25			0.010	

## 2.3 Ceramic Pin Grid Array Package

### 2.3.1 Symbol List for Square Ceramic Pin Grid Array Family

Letter or Symbol	Description of Dimensions
A	Distance from seating plane to highest point of body
A <sub>1</sub>	Distance between seating plane and base plane
A <sub>2</sub>	Distance from base plane to highest point of body
A <sub>3</sub>	Distance from seating plane to bottom of body
A <sub>4</sub>	Heat spreader thickness
B	Diameter of terminal lead pin
D	Largest overall package dimension of length
D <sub>1</sub>	A body length dimension, outer lead center to outer lead center
D <sub>2</sub>	Heat spreader length and width
e <sub>1</sub>	Linear spacing between true lead position centerlines
L	Distance from seating plane to end of lead
N	The total number of potentially usable lead positions
S <sub>1</sub>	Other body dimension, outer lead center to edge of body

**NOTES:**

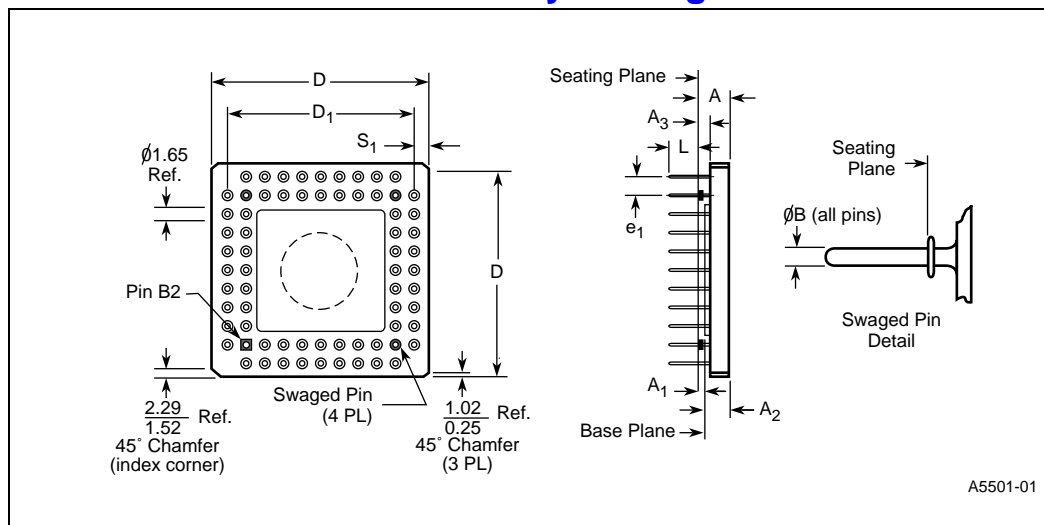
1. Controlling dimension: millimeter.
2. Dimension "e<sub>1</sub>" ("e") is non-cumulative.
3. Seating plane (standoff) is defined by P.C. board hole size: 0.0415 - 0.0430 inch.
4. Dimensions "B", "B<sub>1</sub>" and "C" are nominal.
5. Details of Pin 1 identifier are optional

Packaging Family Attributes	
Category	Ceramic Pin Grid Array
Acronym	C-PGA or PGA
Lead Configuration	Array
Lead Counts	68, 88, 132, 168-208, 240-280, 272-320
Lead Finish	Gold Plate, 60 Micro inches of Gold over 100-350 Micro inches of Nickel Plate
Lead Material	Alloy 42 or Kovar
Lead Braze Material	Copper/Silver Eutectic
Lead Pitch	0.100"
Board Assembly Type	Socket and Insertion Mount

**NOTES:**

1. Alloy 42 or Kovar Leads.
2. Multilayer Co-Fired Ceramic Body.
3. Some body sizes have variable pin count.

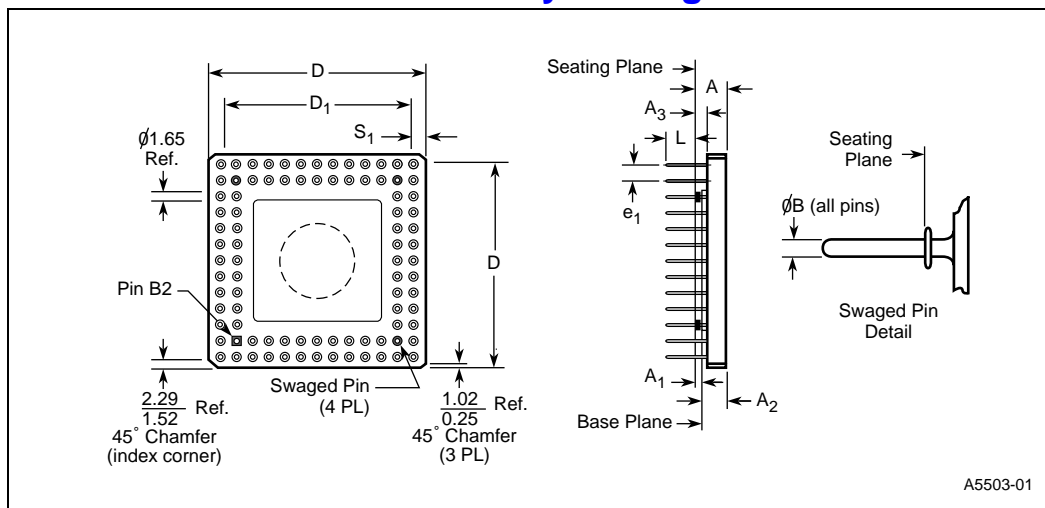
## 2.3.2 68 Lead Ceramic Pin Grid Array Package



Family: Ceramic Pin Grid Array Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	3.56	4.57		0.140	0.180	
$A_1$	0.76	1.27	Solid Lid	0.030	0.050	Solid Lid
$A_1$		0.41	EPROM Lid		0.016	EPROM Lid
$A_2$	2.72	3.43	Solid Lid	0.107	0.135	Solid Lid
$A_2$	3.43	4.32	EPROM Lid	0.135	0.170	EPROM Lid
$A_3$	1.14	1.40		0.045	0.055	
B	0.43	0.51		0.017	0.020	
D	28.95	29.97		1.140	1.180	
$D_1$	25.27	25.53		0.995	1.005	
$e_1$	2.29	2.79		0.090	0.110	
L	2.54	3.30		0.100	0.130	
N	68			68		
$S_1$	1.27	2.54		0.050	0.100	

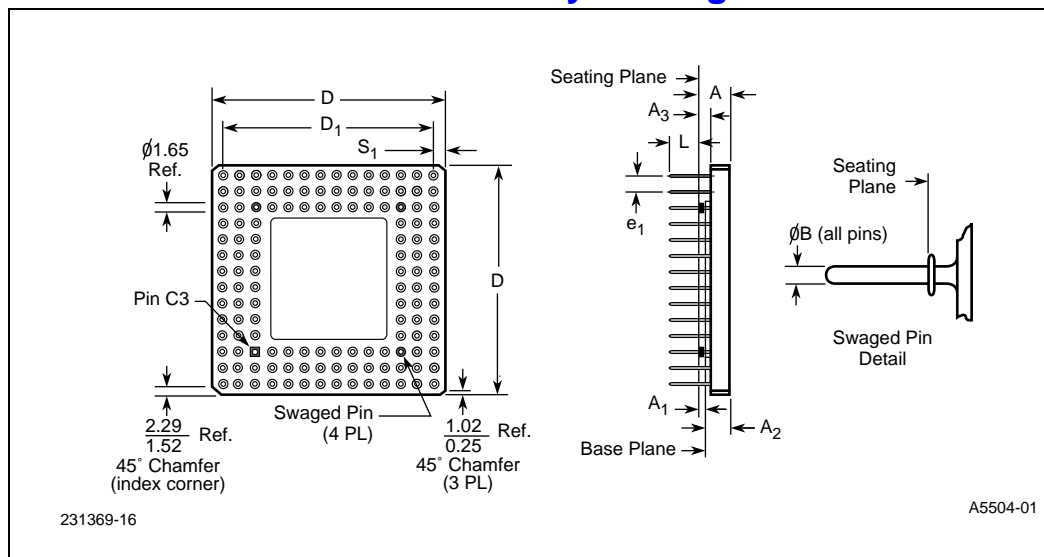


### 2.3.3 88 Lead Ceramic Pin Grid Array Package



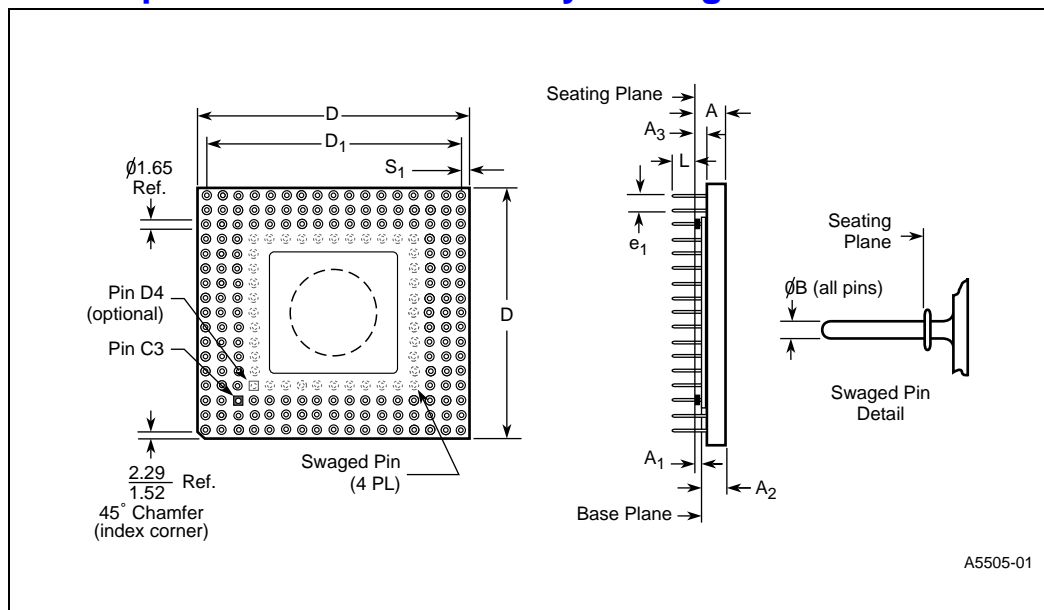
Family: Ceramic Pin Grid Array Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	3.56	4.57		0.140	0.180	
A <sub>1</sub>	0.76	1.27	Solid Lid	0.030	0.050	Solid Lid
A <sub>2</sub>	2.67	3.43	Solid Lid	0.105	0.135	Solid Lid
A <sub>3</sub>	1.14	1.40		0.045	0.055	
B	0.43	0.51		0.017	0.020	
D	34.03	35.05		1.340	1.380	
D <sub>1</sub>	30.35	30.61		1.195	1.205	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
L	2.54	3.30		0.100	0.130	
N	88			88		
S <sub>1</sub>	1.27	2.54		0.050	0.100	

## 2.3.4 132 Lead Ceramic Pin Grid Array Package



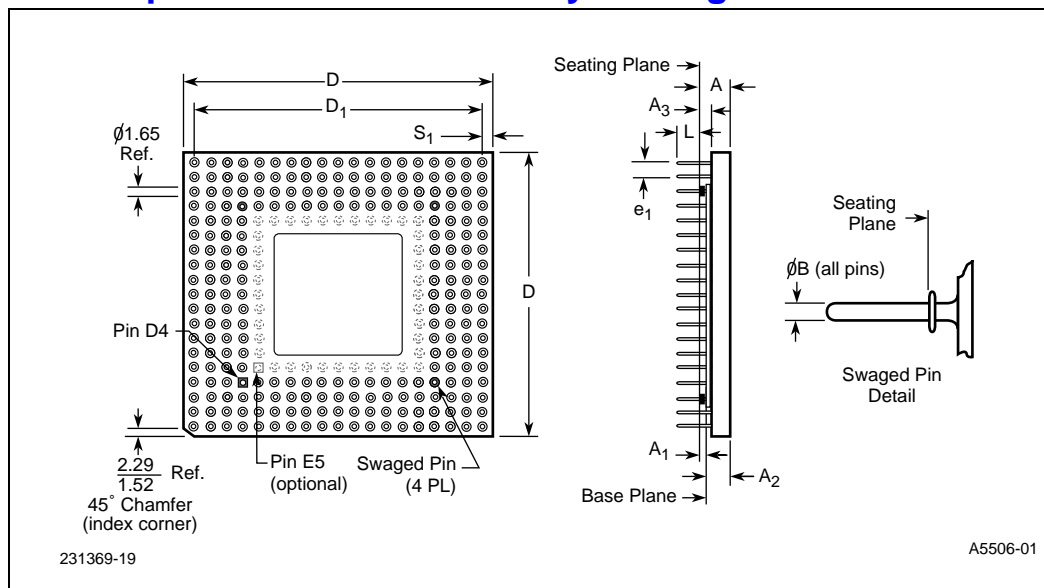
Family: Ceramic Pin Grid Array Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	3.56	4.57		0.140	0.180	
$A_1$	0.76	1.27	Solid Lid	0.030	0.050	Solid Lid
$A_2$	2.67	3.43	Solid Lid	0.105	0.135	Solid Lid
$A_3$	1.14	1.40		0.045	0.055	
B	0.43	0.51		0.017	0.020	
D	36.57	37.59		1.440	1.480	
$D_1$	32.89	33.15		1.295	1.305	
$e_1$	2.29	2.79		0.090	0.110	
L	2.54	3.30		0.100	0.130	
N	132			132		
$S_1$	1.27	2.54		0.050	0.100	

## 2.3.5 1.75" Sq. Ceramic Pin Grid Array Package



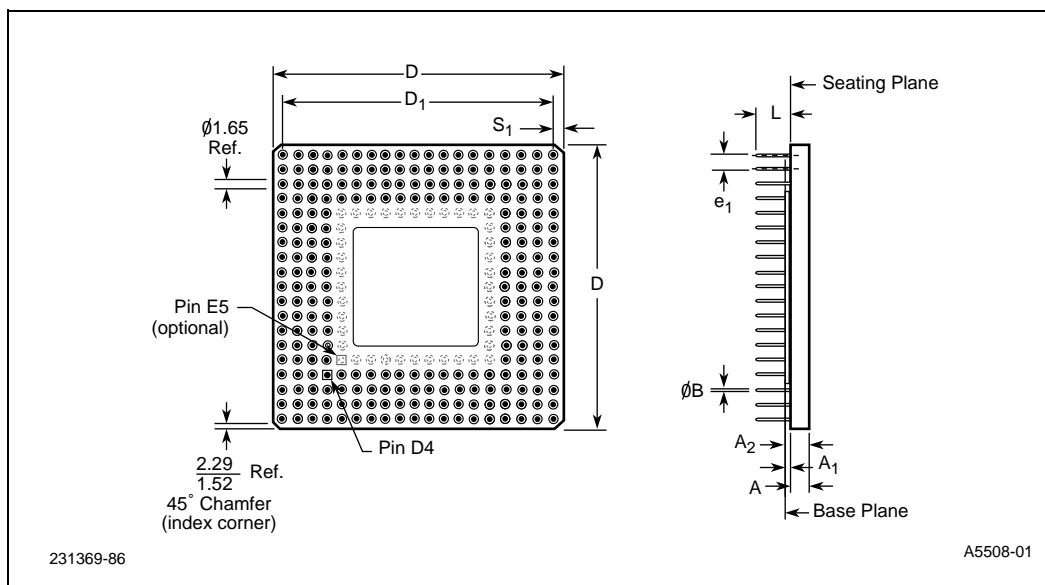
Family: Ceramic Pin Grid Array Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	3.56	4.57		0.140	0.180	
A <sub>1</sub>	0.64	1.14	Solid Lid	0.025	0.045	Solid Lid
A <sub>2</sub>	2.79	3.56	Solid Lid	0.110	0.140	Solid Lid
A <sub>3</sub>	1.14	1.40		0.045	0.055	
B	0.43	0.51		0.017	0.020	
D	44.19	45.21		1.740	1.780	
D <sub>1</sub>	40.51	40.77		1.595	1.605	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
L	2.54	3.30		0.100	0.130	
N	168/208			168/208		
S <sub>1</sub>	1.52	2.54		0.060	0.100	

## 2.3.6 1.95" Sq. Ceramic Pin Grid Array Package



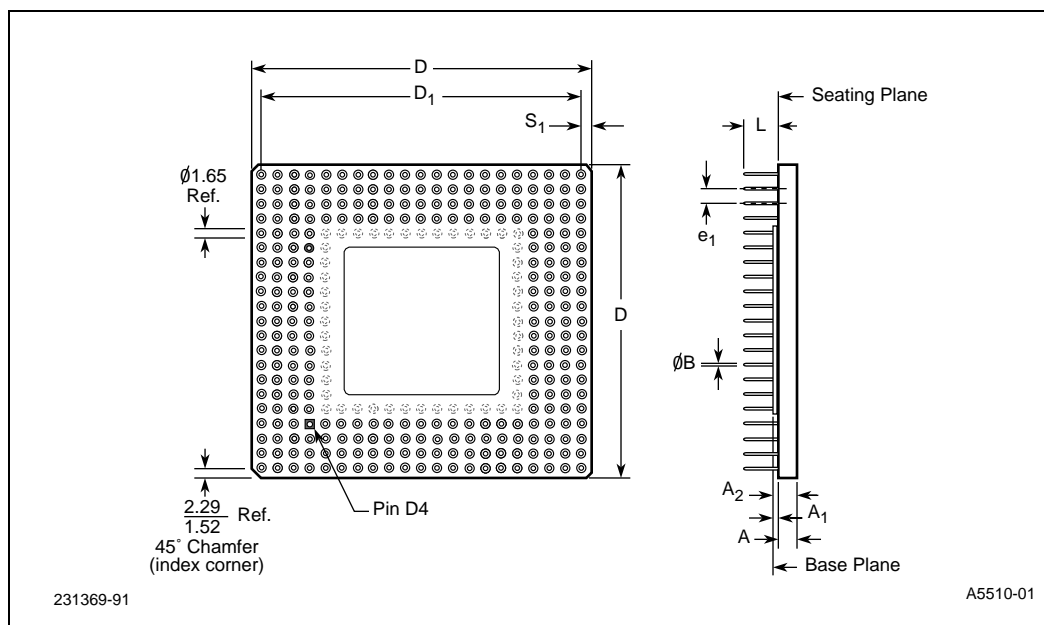
Family: Ceramic Pin Grid Array Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	3.56	4.57		0.140	0.180	
$A_1$	0.64	1.14	Ceramic Lid	0.025	0.045	Ceramic
$A_2$	2.79	3.56	Ceramic Lid	0.110	0.140	Ceramic
$A_3$	1.14	1.40		0.045	0.055	
B	0.43	0.51		0.017	0.020	
D	49.27	50.29		1.940	1.980	
$D_1$	45.59	45.85		1.795	1.805	
$e_1$	2.29	2.79		0.090	0.110	
L	2.54	3.30		0.100	0.130	
N	240	280		240	280	
$S_1$	1.52	2.54		0.060	0.100	

## 2.3.7 1.95" Sq. Ceramic Pin Grid Array Package Variation: Without Stand-Off Pins



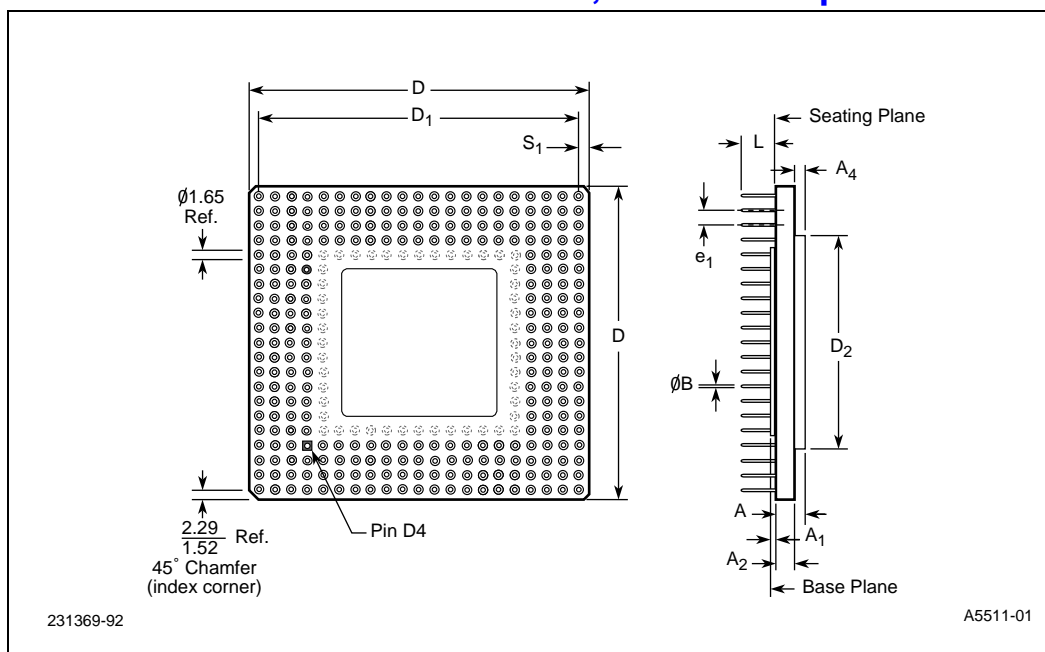
Family: Ceramic Pin Grid Array Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	2.51	3.07		0.099	0.121	
A <sub>1</sub>	0.33	0.43	Metal Lid	0.013	0.017	Metal
A <sub>2</sub>	2.84	3.51	Metal Lid	0.112	0.138	Metal
B	0.43	0.51		0.017	0.020	
D	49.53	50.29		1.940	1.980	
D <sub>1</sub>	45.59	45.85		1.795	1.805	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
L	2.54	3.30		0.120	0.130	
N	240	280		240	280	
S <sub>1</sub>	1.52	2.54		0.060	0.100	

### 2.3.8 2.16" Sq. Ceramic Pin Grid Array Package Variation: Without Stand-Off Pins



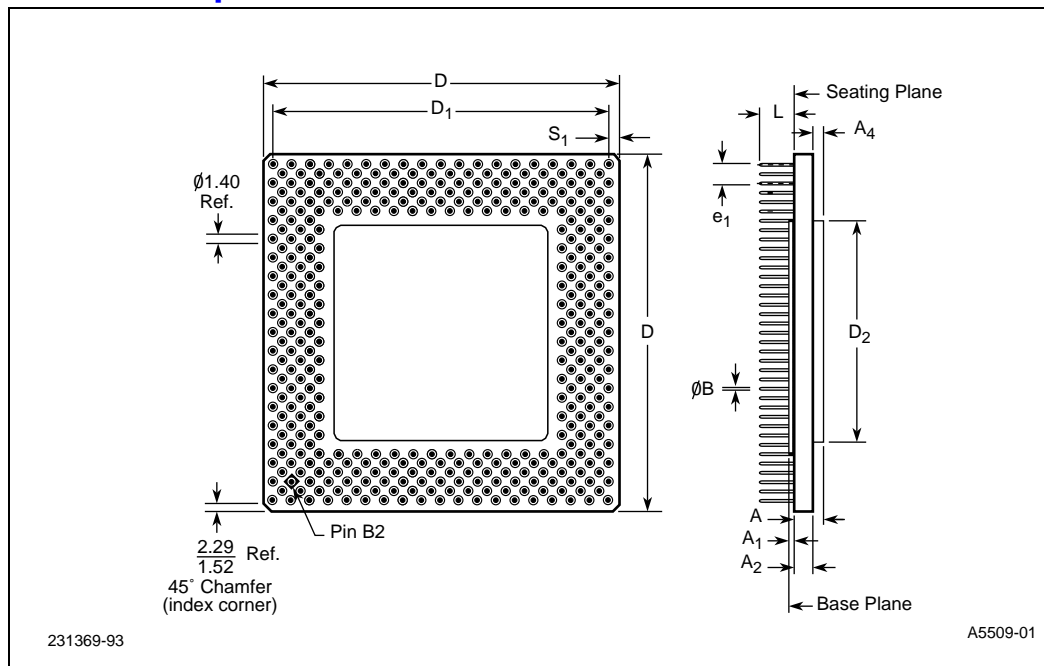
Family: Ceramic Pin Grid Array Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	2.62	2.97		0.103	0.117	
A <sub>1</sub>	0.38	0.43	Metal Lid	0.015	0.017	Metal Lid
A <sub>2</sub>	2.94	3.48	Metal Lid	0.116	0.137	Metal Lid
B	0.43	0.51		0.017	0.020	
D	54.61	55.12		2.150	2.170	
D <sub>1</sub>	50.67	50.93		1.995	2.005	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
L	2.54	3.30		0.120	0.130	
N	272	320		272	320	
S <sub>1</sub>	1.651	2.16		0.065	0.085	

## 2.3.9 2.16" Sq. Ceramic Pin Grid Array Package Variation: Without Stand-Off Pins, With Heat Spreader



Family: Ceramic Pin Grid Array Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	3.59	4.19	Metal Lid	0.141	0.165	Metal Lid
A <sub>1</sub>	0.38	0.43	Metal Lid	0.015	0.017	Metal Lid
A <sub>2</sub>	2.62	2.97		0.103	0.117	
A <sub>4</sub>	0.97	1.22		0.038	0.048	
B	0.43	0.51		0.017	0.020	
D	54.61	55.12		2.150	2.170	
D <sub>1</sub>	50.67	50.93		1.995	2.005	
D <sub>2</sub>	37.85	38.35		1.490	1.510	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
L	3.05	3.30		0.120	0.130	
N	272	320		272	320	
S <sub>1</sub>	1.651	2.16		0.065	0.085	

### 2.3.10 1.95" Sq. Ceramic Pin Grid Array Package Variation: Without Stand-Off Pins, Staggered 0.100" Pitch With Heat Spreader

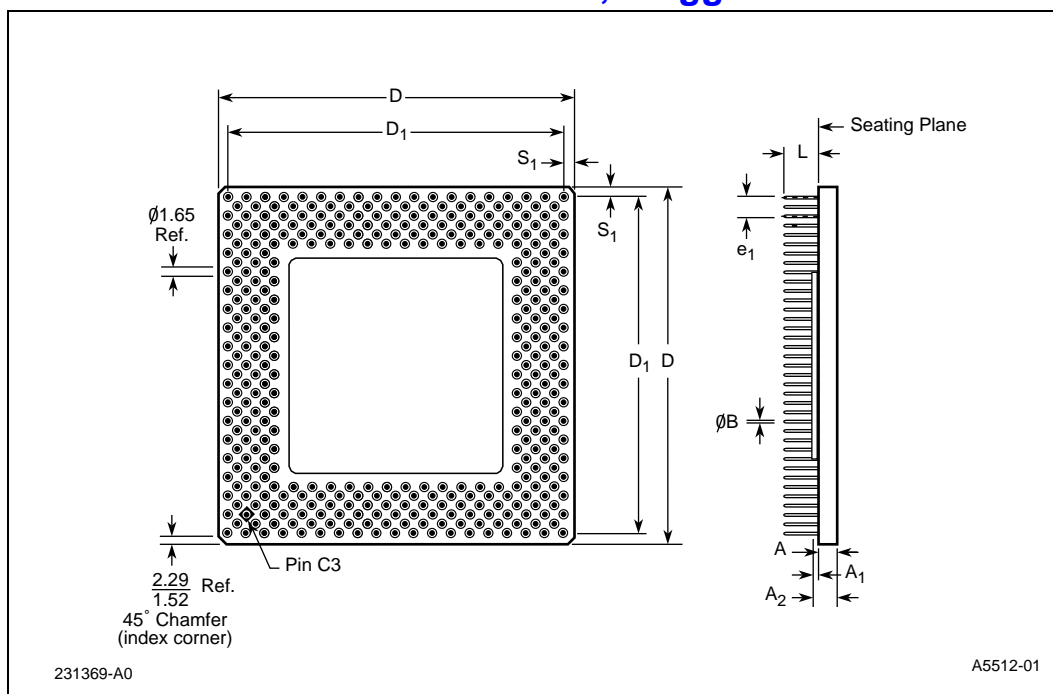


Family: Ceramic Pin Grid Array Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	3.59	4.19	Metal Lid	0.141	0.165	Metal Lid
A <sub>1</sub>	0.38	0.43	Metal Lid	0.015	0.017	Metal Lid
A <sub>2</sub>	2.62	2.97		0.103	0.117	
A <sub>4</sub>	0.97	1.22		0.038	0.048	
B	0.43	0.51		0.017	0.020	
D	49.28	49.78		1.940	1.960	
D <sub>1</sub>	45.59	45.85		1.795	1.805	
D <sub>2</sub>	31.50	32.00		1.240	1.260	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
L	3.05	3.30		0.120	0.130	
N	264	372		264	372	
S <sub>1</sub>	1.52	2.54		0.060	0.100	



## 2.3.11 1.95" Sq. Ceramic Pin Grid Array Package

### Variation: Without Stand-Off Pins, Staggered 0.100" Pitch



Family: Ceramic Pin Grid Array Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	2.62	2.97		0.103	0.117	
$A_1$	0.69	0.84	Ceramic Lid	0.027	0.033	Ceramic Lid
$A_2$	3.31	3.81	Ceramic Lid	0.130	0.150	Ceramic Lid
B	0.43	0.51		0.017	0.020	
D	49.28	49.78		1.940	1.960	
$D_1$	45.59	45.85		1.795	1.805	
$e_1$	2.29	2.79		0.090	0.110	
L	3.05	3.30		0.120	0.130	
N	264	372		264	372	
$S_1$	1.52	2.54		0.060	0.100	

## 2.3.12 Ceramic Rectangular Pin Grid Array Package Family

Letter or Symbol	Description of Dimensions
A	Distance from seating plane to top of spreader
A <sub>1</sub>	Distance between seating plane and base plane
A <sub>2</sub>	Distance from base plane to highest point of body
A <sub>3</sub>	Distance from seating plane to bottom of body
A <sub>4</sub>	Head spreader thickness
A <sub>5</sub>	Pin center to lid clearance
B	Diameter of terminal pin
D	Largest overall package dimension width
D <sub>1</sub>	Body width dimension, outer lead center to outer lead center
D <sub>2</sub>	Heat spreader width
E	Largest overall package dimension length
E <sub>1</sub>	Body length dimension, outer lead center to outer lead center
E <sub>2</sub>	Heat spreader length
e <sub>1</sub>	Linear spacing between true lead position centerlines
e <sub>2</sub>	Linear spacing between true lead position centerlines "staggered pitch"
F <sub>1</sub>	Capacitor clearance area
F <sub>2</sub>	Capacitor clearance area
F <sub>3</sub>	Capacitor clearance area
F <sub>4</sub>	Capacitor clearance area
F <sub>5</sub>	Capacitor clearance area
L	Distance from seating plane to end of lead
N	Lead count
S <sub>1</sub>	Other body dimensions, outer lead center to edge of body

**NOTES:**

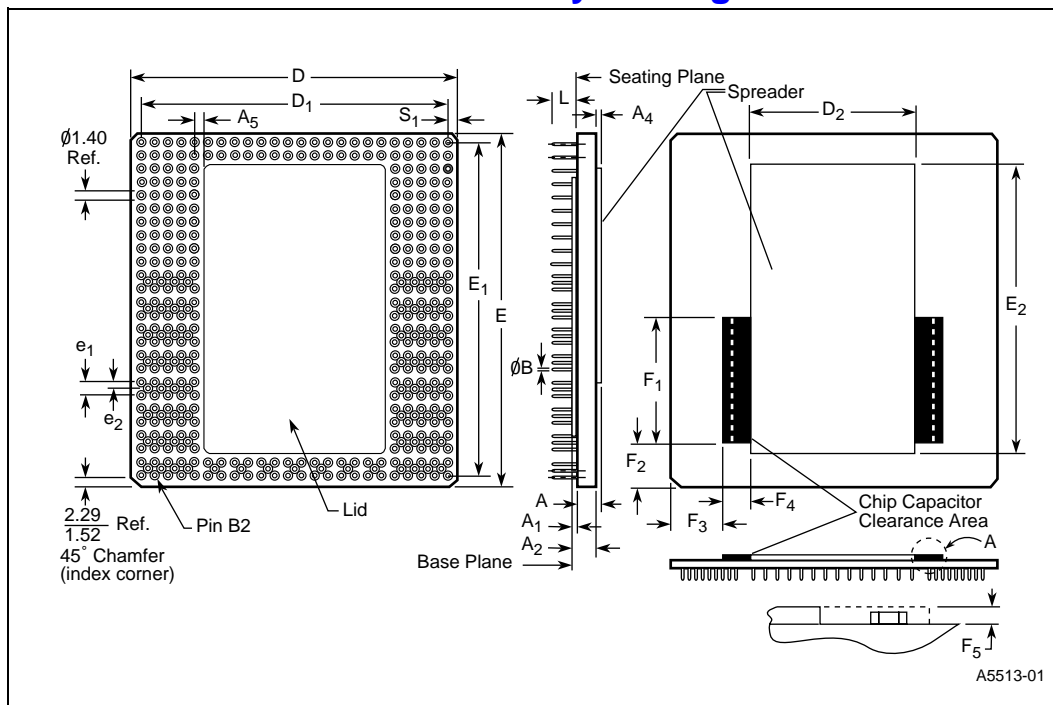
1. Controlling dimensions: Inches.
2. Dimensions "e<sub>1</sub>" (e) is non-cumulative.
3. Details of Pin 1 identifier are optional.

Packaging Family Attributes	
Category	Ceramic Pin Grid Array
Acronym	CPGA, PGA or SPGA
Lead Configuration	Array
Lead Counts	387
Lead Material	Kovar over Alloy 42
Lead Pitch	0.100" Staggered
Board Assembly Type	Socket Mount

**NOTES:**

1. Alloy 42 or Kovar leads.
2. Multilayer Co-Fired Ceramic Body.

### 2.3.13 387 Lead Ceramic Pin Grid Array Package



Family: Ceramic Pin Grid Array Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	3.56	4.19		0.140	0.165	
A <sub>1</sub>	—	1.19	Solid Lid	—	0.047	Solid Lid
A <sub>2</sub>	—	5.46	Solid Lid	—	0.215	Solid Lid
A <sub>4</sub>	0.97	1.22		0.038	0.048	
A <sub>5</sub>	1.07	—		0.042	—	
B	0.43	0.51		0.017	0.020	
D	62.23	62.74		2.450	2.470	
D <sub>1</sub>	58.29	58.55		2.295	2.305	
D <sub>2</sub>	30.48	35.56		1.200	1.400	
E	67.31	67.82		2.650	2.670	
E <sub>1</sub>	63.37	63.63		2.495	2.505	
E <sub>2</sub>	56.26	56.77		2.215	2.235	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
e <sub>2</sub>	1.02	1.52		0.040	0.060	
F <sub>1</sub>	—	26.04		—	1.025	
F <sub>2</sub>	9.65	—		0.290	—	
F <sub>3</sub>	9.65	—		0.380	—	
F <sub>4</sub>	—	4.95		—	0.195	
F <sub>5</sub>	—	1.22		—	0.048	
L	3.05	3.30		0.120	0.130	
N	387			387		
S <sub>1</sub>	1.52	2.54		0.060	0.100	

## 2.4 Cerdip Dual In-line Package

### 2.4.1 Symbol List for Cerdip Dual In-Line Family

Letter or Symbol	Description of Dimensions
A	Distance from seating plane to highest point of body
A <sub>1</sub>	Distance between seating plane and base plane
A <sub>2</sub>	Distance from base plane to highest point of body (lid)
A <sub>3</sub>	Base body thickness
B	Width of terminal leads
B <sub>1</sub>	Width of terminal lead shoulder which locate seating plane (standoff geometry optional)
C	Thickness of terminal leads
D	Largest overall package dimension of length
D <sub>2</sub>	A body length dimension, end lead center to end lead center
E	Largest overall package width dimension outside of lead
E <sub>1</sub>	Body width dimensions not including leads
e <sub>A</sub>	Linear spacing of true minimum lead position center line to center line
e <sub>B</sub>	Linear spacing between true lead position outside of lead to outside of lead
e <sub>1</sub>	Linear spacing between centerlines of body standoffs (terminal leads)
L	Distance from seating plane to end of lead
N	The total number of potentially usable lead positions
S	Distance from true position centerline of No. 1 lead position to the extremity of the body
S <sub>1</sub>	Distance from outer end lead edge positions to the extremity of the body
α	Angular spacing between minimum and maximum lead positions measured at the gauge plane

**NOTES:**

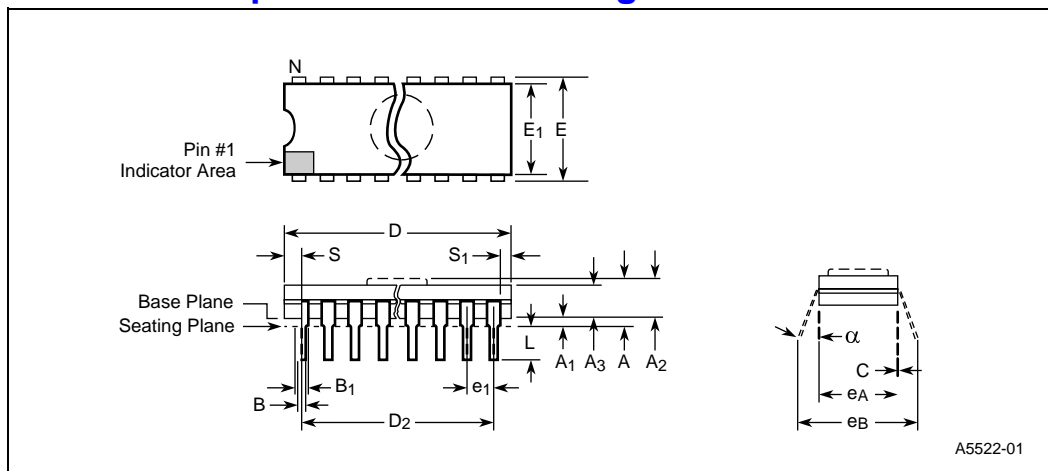
1. Controlling dimension: millimeter.
2. Dimension "e<sub>1</sub>" ("e") is non-cumulative.
3. Seating plane (standoff) is defined by P.C. board hole size: 0.0415 - 0.0430 inch.
4. Dimension "B<sub>1</sub>" is normal.

Package Family Attributes	
Category	Cerdip
Acronym	Cerdip
Lead Configuration	Dual-In-Line
Lead Counts	20, 28, 40
Lead Finish	Hot Solder Dip
Lead Pitch	0.100"
Board Assembly Type	Socket and Surface Mount

**NOTES:**

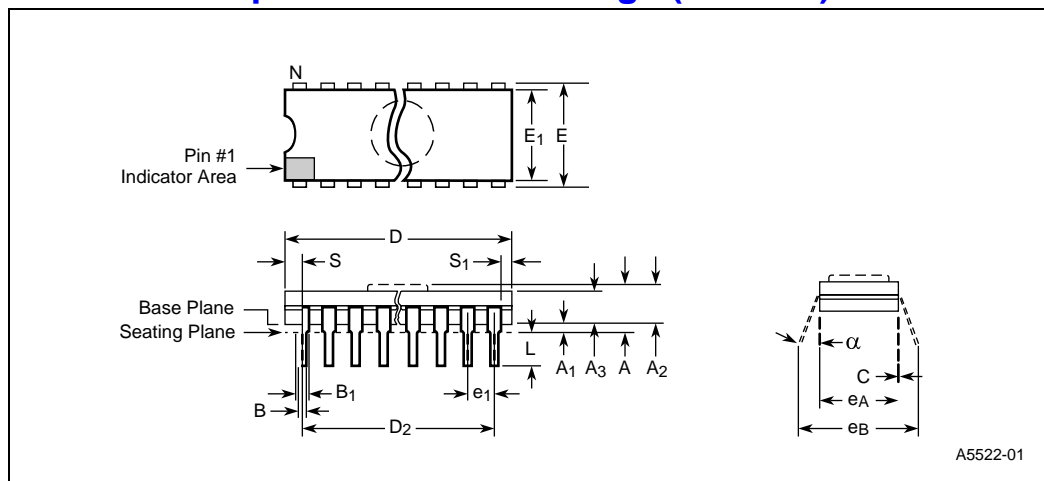
1. Alloy 42 Leads.
2. Pressed Ceramic Body.
3. UV Window is available for reprogramming.

## 2.4.2 20 Lead Cerdip Dual In-Line Package



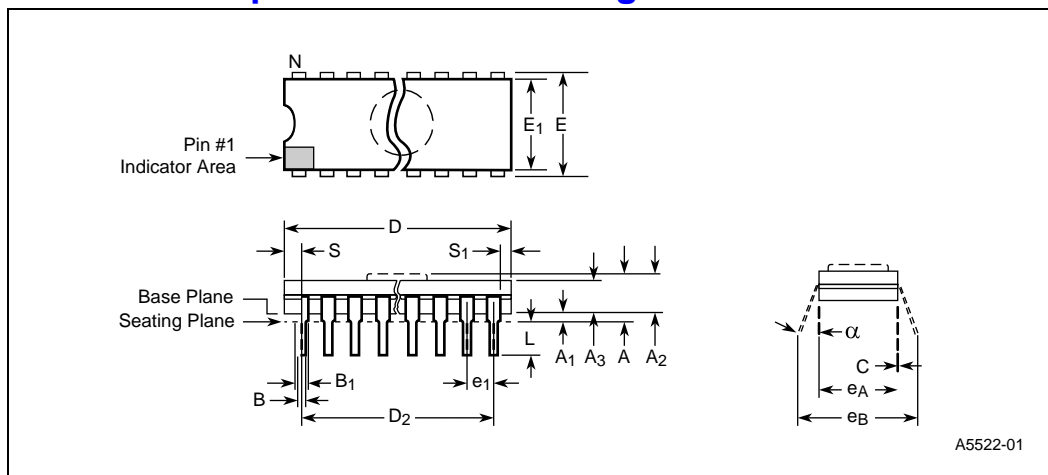
Family: Cerdip Dual In-Line Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
α	0°	10°		0°	10°	
A		5.08			0.200	
A <sub>1</sub>	0.38			0.015		
A <sub>2</sub>	3.56	4.44		0.140	0.175	
A <sub>3</sub>	3.56	4.44		0.140	0.175	
B	0.41	0.51		0.016	0.020	
B <sub>1</sub>	1.52		Typical	0.060		Typical
C	0.23	0.30	Typical	0.009	0.012	Typical
D	24.38	25.27		0.960	0.995	
D <sub>2</sub>	22.86		Reference	0.900		Reference
E	7.62	8.13		0.300	0.320	
E <sub>1</sub>	7.11	7.90		0.280	0.311	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
e <sub>A</sub>	7.87		Reference	0.310		Reference
e <sub>B</sub>	8.13	10.16		0.320	0.400	
L	3.18	3.81		0.125	0.150	
N	20		½ Leads	20		½ Leads
S	0.38	1.78		0.015	0.070	
S <sub>1</sub>	0.13			0.005		

### 2.4.3 28 Lead Cerdip Dual In-Line Package (600 MIL)



Family: Cerdip Dual In-Line Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
$\alpha$	0°	10°		0°	10°	
A		5.72			0.225	
A <sub>1</sub>	0.38			0.015		
A <sub>2</sub>	3.56	4.95		0.140	0.195	
A <sub>3</sub>	3.56	4.70		0.140	0.185	
B	0.41	0.51		0.016	0.020	
B <sub>1</sub>	1.52		Typical	0.060		Typical
C	0.23	0.30	Typical	0.009	0.012	Typical
D	36.58	37.72		1.440	1.485	
D <sub>2</sub>	33.02		Reference	1.300		Reference
E	15.24	15.75		0.600	0.620	
E <sub>1</sub>	13.08	15.37		0.515	0.605	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
e <sub>A</sub>	15.49		Reference	0.610		Reference
e <sub>B</sub>	15.75	17.78		0.620	0.700	
L	3.18	4.32		0.125	0.170	
N	28			28		
S	1.40	2.29		0.055	0.090	
S <sub>1</sub>	0.13			0.005		

## 2.4.4 40 Lead Cerdip Dual In-Line Package



Family: Cerdip Dual In-Line Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
$\alpha$	0°	10°		0°	10°	
A		5.72			0.225	
A <sub>1</sub>	0.38			0.015		
A <sub>2</sub>	3.56	4.95		0.140	0.195	
A <sub>3</sub>	3.56	4.70		0.140	0.185	
B	0.41	0.51		0.016	0.020	
B <sub>1</sub>	1.52		Typical	0.060		Typical
C	0.23	0.30		0.009	0.012	
D	51.69	52.96		2.035	2.085	
D <sub>2</sub>	48.26		Reference	1.900		Reference
E	15.24	15.75		0.600	0.620	
E <sub>1</sub>	13.08	15.37		0.515	0.605	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
e <sub>A</sub>	15.49		Reference	0.610		Reference
e <sub>B</sub>	15.75	17.78		0.620	0.700	
L	3.18	4.32		0.125	0.170	
N	40			40		
S	1.40	2.29		0.055	0.090	
S <sub>1</sub>	0.13			0.005		

## 2.5 Plastic Dual In-line Package

### 2.5.1 Symbol List for Plastic Dual In-Line Family

Letter or Symbol	Description of Dimensions
$\alpha$	Angular spacing between minimum and maximum lead positions measured at the gauge plane
A	Distance from seating plane to highest point of body (lid)
A <sub>1</sub>	Distance between seating plane and base plane
A <sub>2</sub>	Distance from base plane to highest point of body (lid)
A <sub>3</sub>	Base body thickness
B	Width of terminal leads
B <sub>1</sub>	Width of terminal lead shoulder which locates seating plane (standoff geometry optional)
C	Thickness of terminal leads
D	Largest overall package dimension of length
D <sub>2</sub>	A body length dimension, end lead center to end lead center
E	Largest overall package width dimension outside of lead
E <sub>1</sub>	Body width dimensions not including leads
e <sub>A</sub>	Linear spacing of true minimum lead position center line to center line
e <sub>B</sub>	Linear spacing between true lead position outside of lead to outside of lead
e <sub>1</sub>	Linear spacing between centerlines of body standoffs (terminal leads)
L	Distance from seating plane to end of lead
N	The total number of potentially usable lead positions
S	Distance from true position centerline of No. 1 lead position to the extremity of the body
S <sub>1</sub>	Distance from outer end lead edge positions to the extremity of the body

**NOTES:**

1. Controlling dimension: millimeter.
2. Dimension "e<sub>1</sub>" ("e") is non-cumulative.
3. Seating plane (standoff) is defined by P.C. board hole size: 0.0415 - 0.0430 inch.
4. Dimension "B<sub>1</sub>" is normal.
5. Details of Pin 1 identifier are optional.

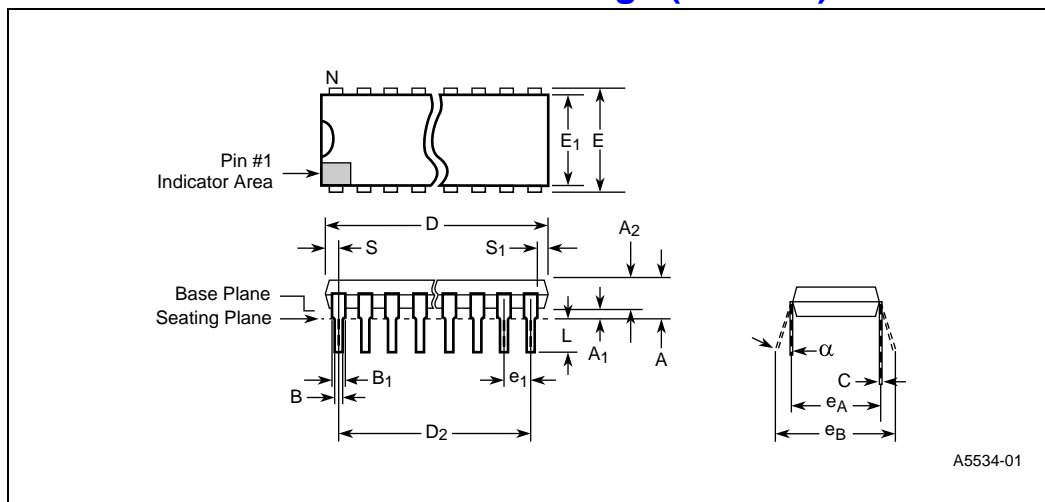
Packaging Family Attributes	
Category	Plastic Dual-In-Line
Acronym	PDIP
Lead Configuration	Dual-In-Line
Lead Counts	24, 28, 32, 40, 64
Lead Finish	Solder Coat
Lead Pitch	0.100" (excludes shrink)
Board Assembly Type	Socket and Surface Mount

**NOTES:**

1. Alloy 42 and Cu Alloy Leads

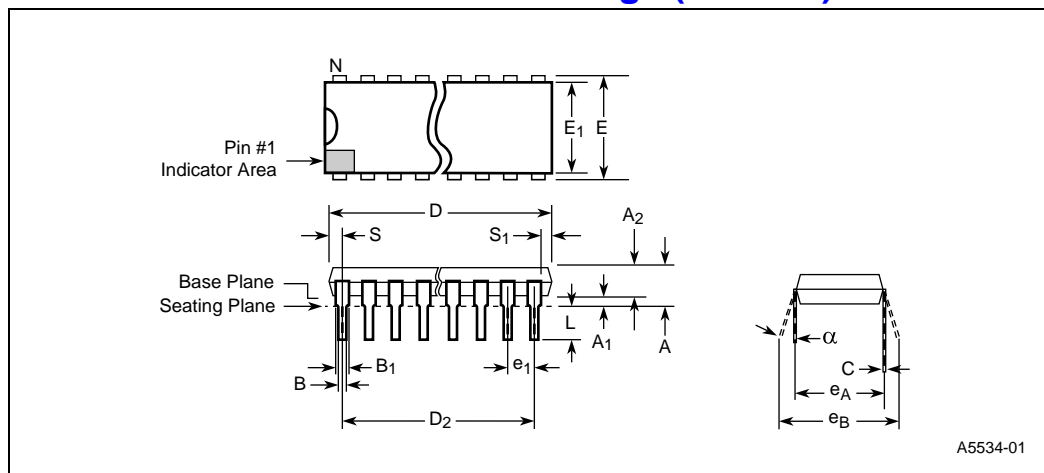


## 2.5.2 24 Lead Plastic Dual In-Line Package (600 MIL)



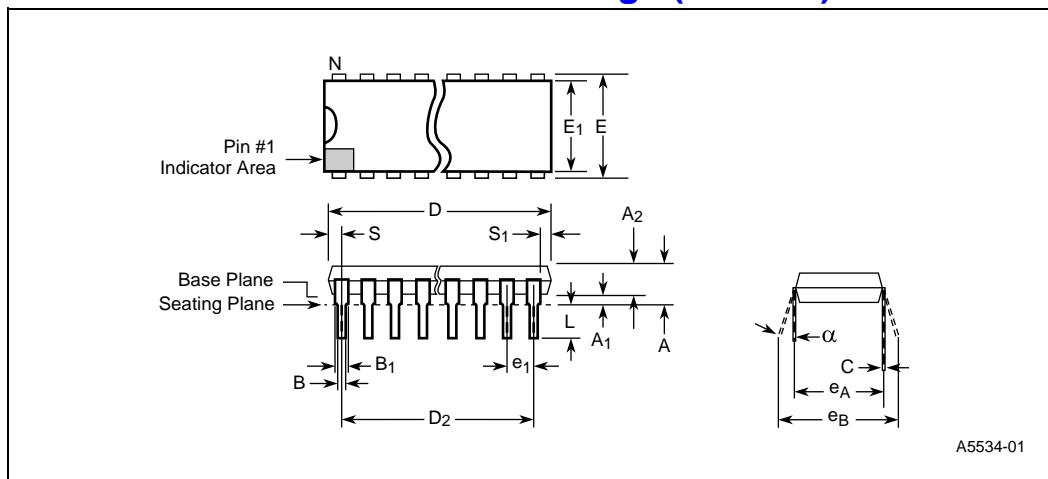
Family: Plastic Dual In-Line Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
$\alpha$	0°	10°		0°	10°	
A		5.08			0.200	
A <sub>1</sub>	0.38			0.015		
A <sub>2</sub>	3.68	4.06		0.145	0.160	
B	0.41	0.51		0.016	0.020	
B <sub>1</sub>	1.52		Typical	0.060		Typical
C	0.23	0.30	Typical	0.009	0.012	Typical
D	31.37	32.00		1.235	1.260	
D <sub>2</sub>	27.94		Reference	1.100		Reference
E		15.75			0.620	
E <sub>1</sub>	13.59	13.84		0.535	0.545	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
e <sub>A</sub>	14.99		Reference	0.590		Reference
e <sub>B</sub>	15.24	17.78		0.600	0.700	
L	3.18	3.68		0.125	0.145	
N	24		600 MIL	24		600 MIL
S	1.52	2.03		0.060	0.080	
S <sub>1</sub>	0.74			0.029		

### 2.5.3 28 Lead Plastic Dual In-Line Package (600 MIL)



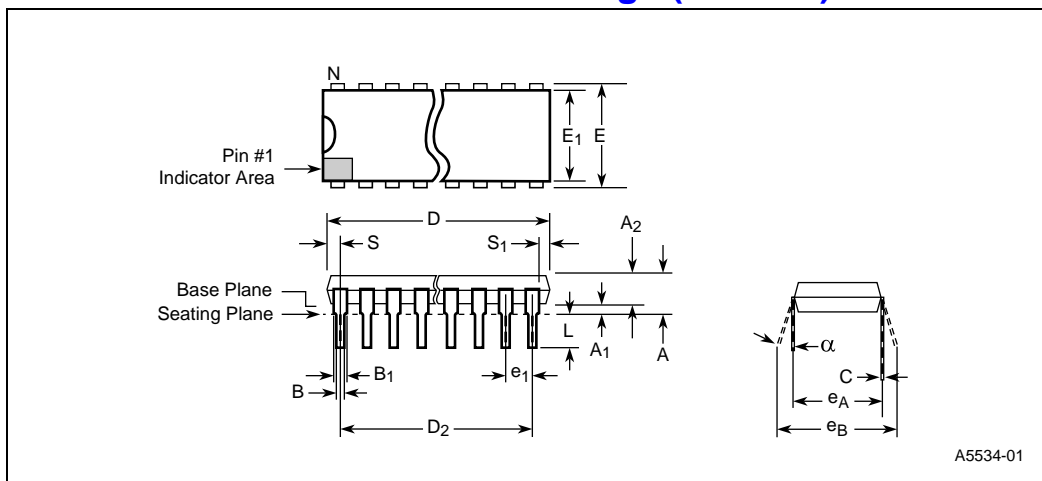
Family: Plastic Dual In-Line Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
$\alpha$	0°	10°		0°	10°	
A		5.08			0.200	
A <sub>1</sub>	0.38			0.015		
A <sub>2</sub>	3.68	4.06		0.145	0.160	
B	0.36	0.56		0.014	0.022	
B <sub>1</sub>	1.52		Typical	0.060		Typical
C	0.23	0.30		0.009	0.012	
D	36.70	37.34		1.445	1.470	
D <sub>2</sub>	33.02		Reference	1.300		Reference
E		15.75			0.620	
E <sub>1</sub>	13.59	14.00		0.535	0.551	
e <sub>1</sub>	2.29	2.79		0.090	0.110	
e <sub>A</sub>	14.99		Reference	0.590		Reference
e <sub>B</sub>	15.24	17.78		0.600	0.700	
L	3.18	3.68		0.125	0.145	
N	28		600 MIL	28		600 MIL
S	1.65	2.16		0.065	0.085	
S <sub>1</sub>	0.86			0.034		

## 2.5.4 32 Lead Plastic Dual In-Line Package (600 MIL)



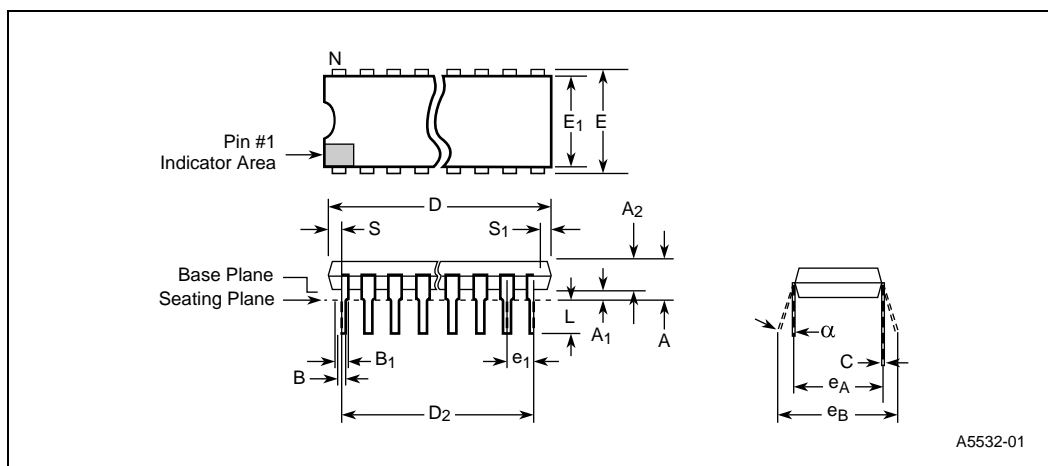
Family: Plastic Dual In-Line Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
$\alpha$	0°	15°		0°	15°	
A		4.83			0.190	
A <sub>1</sub>	0.38			0.015		
A <sub>2</sub>	3.81		Typical	0.150		Typical
B	0.41	0.51		0.016	0.020	
B <sub>1</sub>	1.14	1.40		0.045	0.055	
C	0.20	0.30		0.008	0.012	
D	41.78	42.04		1.645	1.655	
D <sub>2</sub>	38.10		Reference	1.500		Reference
E	15.24	15.88		0.600	0.625	
E <sub>1</sub>	13.46	13.97		0.530	0.550	
e <sub>1</sub>	2.54		Reference	0.100		Reference
e <sub>A</sub>	15.24		Reference	0.600		Reference
e <sub>B</sub>	15.24	17.78		0.600	0.700	
L	3.18	3.43		0.125	0.135	
N	32		600 MIL	32		600 MIL
S	1.78	2.03		0.070	0.080	
S <sub>1</sub>	1.14			0.045		

## 2.5.5 40 Lead Plastic Dual In-Line Package (600 MIL)



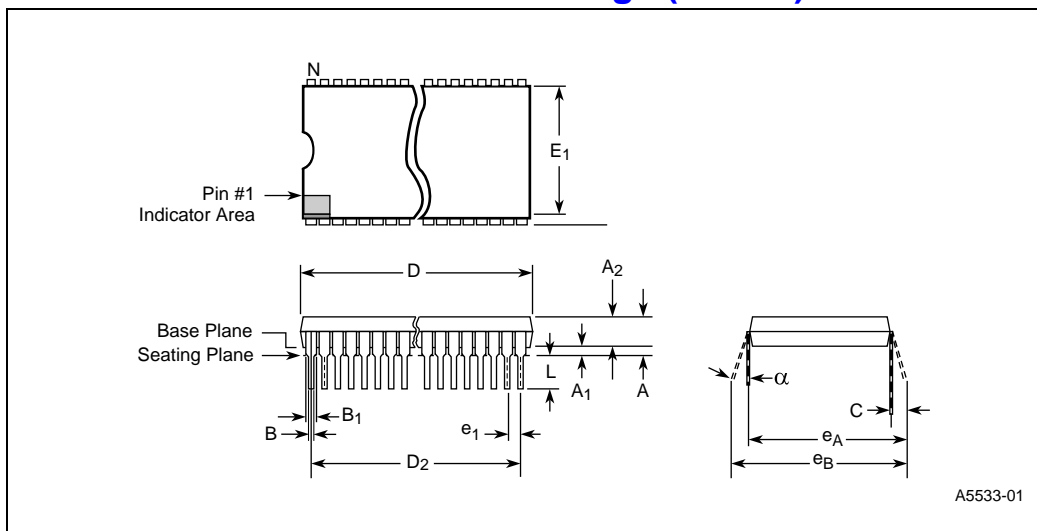
Family: Plastic Dual In-Line Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
$\alpha$	0°	10°		0°	10°	
A		5.08			0.200	
$A_1$	0.38			0.015		
$A_2$	3.94	4.19		0.155	0.165	
B	0.41	0.51		0.016	0.020	
$B_1$	1.27		Typical	0.050		Typical
C	0.23	0.30		0.009	0.012	
D	51.94	52.58		2.045	2.070	
$D_2$	48.26		Reference	1.900		Reference
E		15.75			0.620	
$E_1$	13.59	13.84		0.535	0.545	
$e_1$	2.29	2.79		0.090	0.110	
$e_A$	14.99		Reference	0.590		Reference
$e_B$	15.24	17.78		0.600	0.700	
L	3.18	3.68		0.125	0.145	
N	40			40		
S	1.65	2.16		0.065	0.085	
$S_1$	0.99			0.039		

## 2.5.6 40 Lead Plastic Dual In-Line Package (600 MIL) Variation: ½ Lead



Family: Plastic Dual In-Line Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
$\alpha$	0°	10°		0°	10°	
A	4.55			0.179		
A <sub>1</sub>	0.38			0.015		
A <sub>2</sub>	3.75	3.95	Nom 3.85	0.147	0.155	
B	0.35	0.51		0.014	0.020	
B <sub>1</sub>	1.40	1.60		0.055	0.063	
C	0.25	0.45	Nom 0.35	0.009	0.018	
D		52.30			2.06	
D <sub>2</sub>						
E	13.50	13.09	Nom 13.70	0.531	0.547	
E <sub>1</sub>						
e <sub>1</sub>	2.29	2.79	Nom 2.54	0.090	0.110	
e <sub>A</sub>	14.74	15.74	Nom 15.24	0.580	0.619	
e <sub>B</sub>						
L	3.00	3.60	Nom 3.30	0.118	0.141	
N	40		½ Lead	40		½ Lead
S	1.65	2.16		0.065	0.080	
S <sub>1</sub>						

## 2.5.7 64 Lead Plastic Dual In-Line Package (Shrink)



Family: Plastic Dual In-Line Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
$\alpha$	0°	15°		0°	15°	
A		5.65			0.22	
A <sub>1</sub>	0.51			0.020		
A <sub>2</sub>	4.15	4.35		0.163	0.171	
B	0.35	0.55		0.014	0.022	
B <sub>1</sub>	1.00		Typical	0.040		Typical
C	0.20	0.30		0.008	0.012	
D	57.80	58.20		2.28	2.29	
D <sub>2</sub>	55.12		Reference	2.170		Reference
E						
E <sub>1</sub>	16.80	17.20		0.661	0.677	
e <sub>1</sub>	1.60	1.96		0.063	0.077	
e <sub>A</sub>	19.05			0.750		
e <sub>B</sub>	19.50	21.00		0.767	0.826	
L	3.00	3.60		0.118	0.142	
N	64			64		

## 2.6 Plastic Flatpack Package

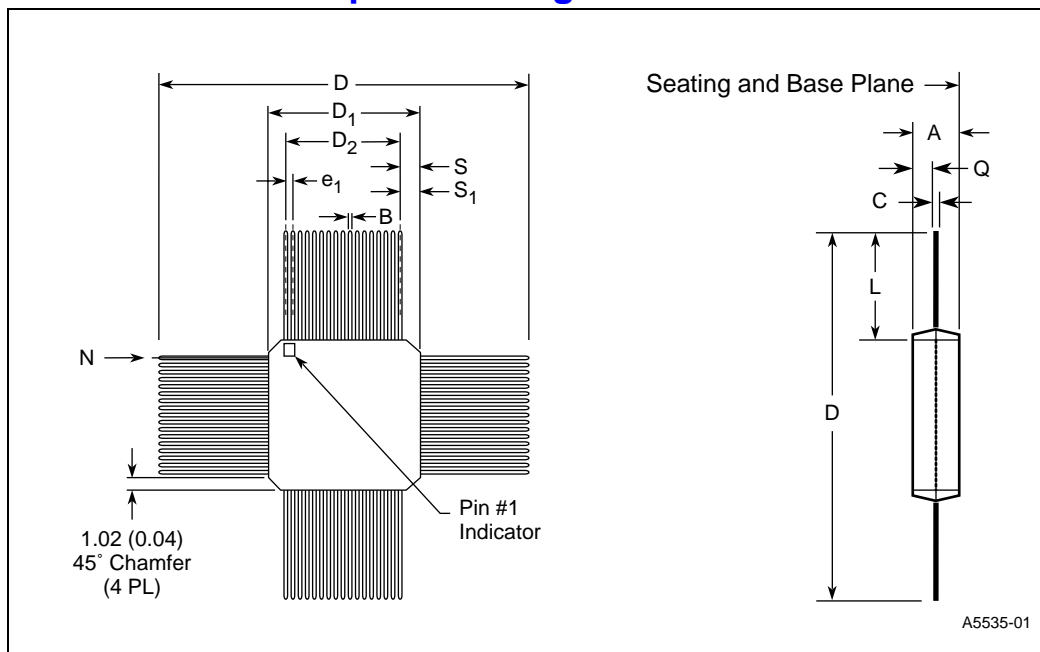
### 2.6.1 Symbol List for Plastic Flatpack Family

Letter or Symbol	Description of Dimensions
A	Distance from seating plane to highest point of body
B	Width of terminal leads
C	Thickness of terminal leads
D	Largest overall package dimension of length
D <sub>1</sub>	Largest overall package dimension of length excluding leads
D <sub>2</sub>	A body length dimension, outer lead center to outer lead center
e <sub>1</sub>	Linear spacing between centerlines of terminal leads
L	Lead dimension free lead length
N	The total number of potentially usable lead positions
Q	Lead plane to top of body plane distance
S	Distance from true position centerline of end lead position to the extremity of the body
S <sub>1</sub>	Linear spacing of true maximum lead position from lead edge to package edge

**NOTES:**

1. Controlling dimension: millimeter.
2. Dimension "e<sub>1</sub>" ("e") is non-cumulative.
3. Seating plane (standoff) is defined by P.C. board hole size: 0.0415 - 0.0430 inch.

## 2.6.2 68 Lead Plastic Flatpack Package



Family: Plastic Flatpack Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	4.19	4.34		0.165	0.171	
B	0.46	0.56		0.018	0.022	Typical
C	0.18	0.25		0.007	0.010	Typical
D	44.45	45.21		1.750	1.780	
$D_1$	24.08	24.26		0.948	0.955	
$D_2$	20.22	20.42		0.796	0.804	
$e_1$	1.22	1.32	Typical	0.048	0.052	Typical
L	10.16	10.80		0.400	0.425	
N	68			68		
Q	2.01	2.06		0.079	0.081	
S	1.73	2.08		0.068	0.082	
$S_1$	1.47			0.058		



## 2.7 Plastic Leaded Chip Carrier Package

### 2.7.1 Symbol List for Plastic Leaded Chip Carrier Family

Letter or Symbol	Description of Dimensions
A	Overall Height: Distance from seating plane to highest point of body
A <sub>1</sub>	Distance from lead shoulder to seating plane
CP	Seating plane coplanarity
D/E	Overall package dimension
D <sub>1</sub> /E <sub>1</sub>	Plastic body dimension
D <sub>2</sub> /E <sub>2</sub>	Footprint
LT	Lead thickness
N	Total number of potentially usable lead positions
N <sub>d</sub>	Total number of leads on short side
N <sub>e</sub>	Total number of leads on long side
TCP	Tweezing coplanarity

#### NOTES: RECTANGLE PACKAGE

1. All dimensions and tolerances conform to ANSI Y 14.5M-1982.
2. Datum plane **-H-** located at top of mold parting line and coincident with top of lead, where lead exits plastic body.
3. Data **A-B** and **-D-** to be determined where center leads exit plastic body at datum plane **-H-**.
4. To be determined at seating plane **-C-**.
5. Dimensions D<sub>1</sub> and E<sub>1</sub> do not include mold protrusion.
6. Pin 1 identifier is located within the defined zone.
7. These two dimensions determine maximum angle of the lead of certain socket applications. If unit is intended to be socketed, it is advisable to review these dimensions with the socket supplier.
8. N<sub>d</sub> denotes the number of leads on the two short sides of the package, one of which contains pin #1. N<sub>e</sub> denotes the number of leads on the two long sides of the package.
9. Controlling dimension, inch.
10. All dimensions and tolerances include lead trim offset and lead plating finish.
11. Tweezing surface planarity is defined as the furthest any lead on a side may be from the datum. The datum is established by touching the outermost lead on that side and parallel to **A-B** or **-D-**.

Packaging Family Attributes	
Category	Plastic Leaded Chip Carrier
Acronym	PLCC
Lead Configuration	Quad
Lead Counts	20, 28, 32, 44, 52, 68, 84
Lead Finish	Solder Plate
Lead Pitch	0.050"
Board Assembly Type	Socket and Surface Mount

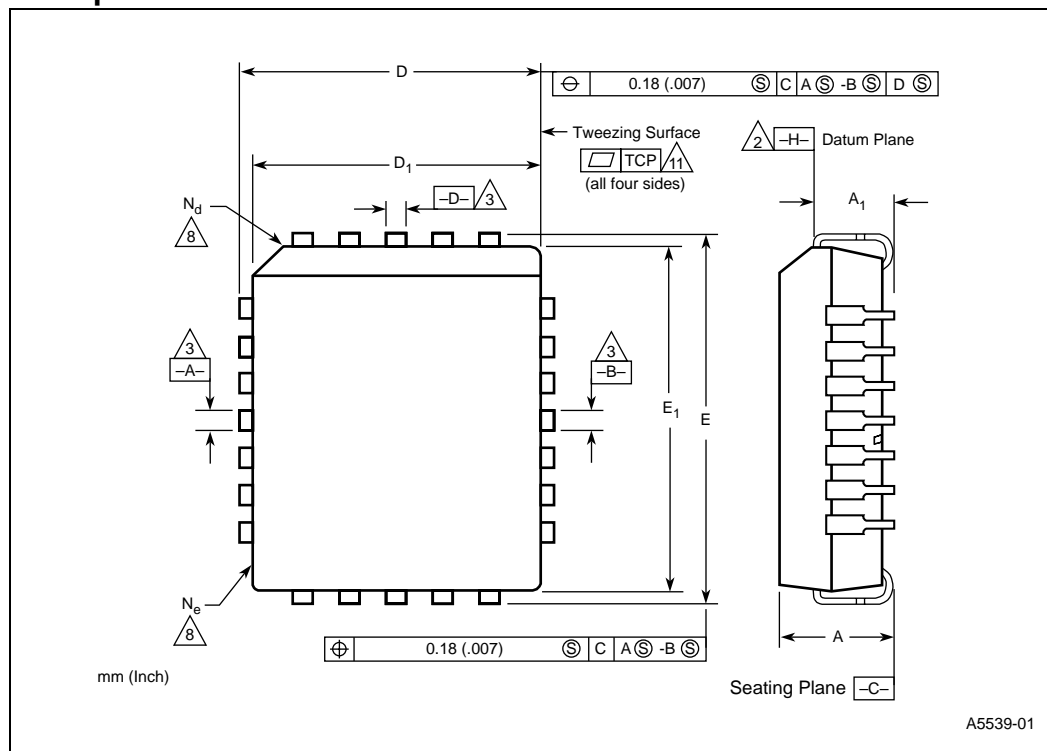
#### NOTES:

1. Copper Alloy Leads.
2. Novalac Body.
3. Bake and desiccant packaging required.

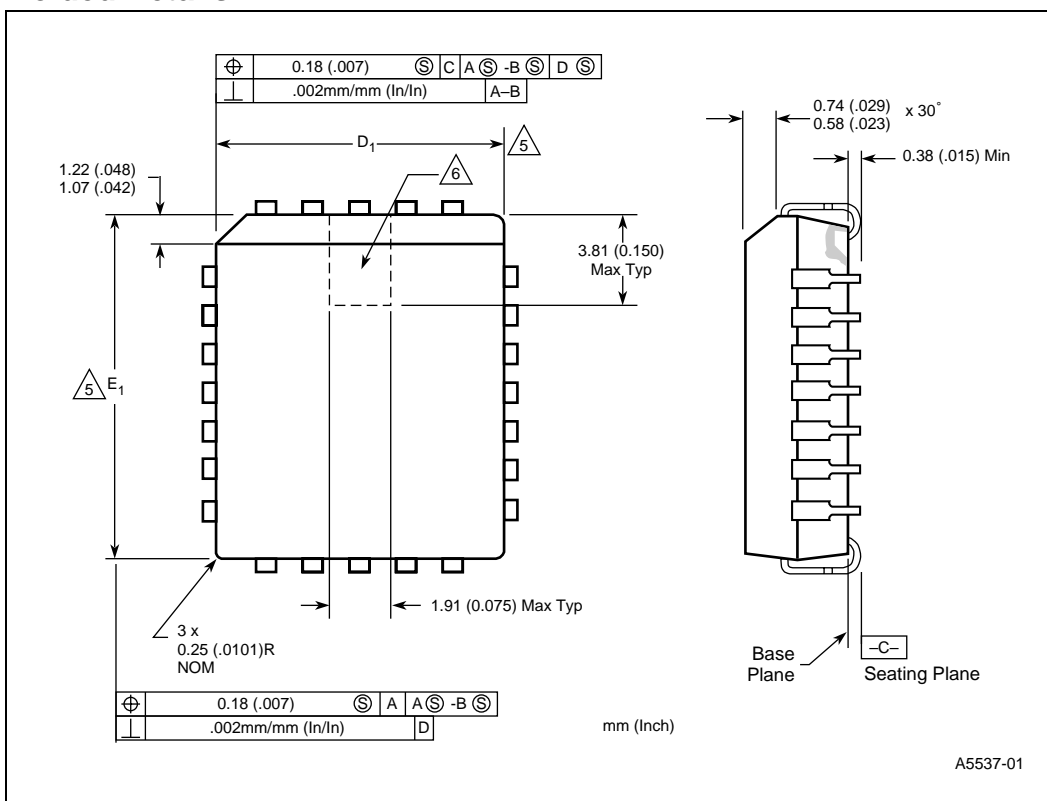
Family: Plastic Lead Chip Carrier-Rectangular (mm)						
	28 Lead			32 Lead		
Symbol	Min	Max	Notes	Min	Max	Notes
A	3.20	3.56		3.20	3.56	
A <sub>1</sub>	1.93	2.29		1.93	2.29	
D	9.78	10.0		12.30	12.60	
D <sub>1</sub>	8.81	8.97		11.40	11.50	
D <sub>2</sub>	7.37	8.38		9.91	10.90	
E	14.90	15.10		14.90	15.10	
E <sub>1</sub>	13.90	14.00		13.90	14.00	
E <sub>2</sub>	12.40	13.50		12.40	13.50	
N	28			32		
N <sub>d</sub>	5			7		
N <sub>e</sub>	9			9		
CP	0.00	0.10		0.00	0.10	
TCP	0.00	0.10		0.00	0.10	
LT	0.23	0.38		0.23	0.38	

Family: Plastic Lead Chip Carrier-Rectangular (inch)						
	28 Lead			32 Lead		
Symbol	Min	Max	Notes	Min	Max	Notes
A	0.126	0.140		0.126	0.140	
A <sub>1</sub>	0.076	0.090		0.076	0.090	
D	0.385	0.394		0.484	0.496	
D <sub>1</sub>	0.347	0.353		0.449	0.453	
D <sub>2</sub>	0.290	0.330		0.390	0.429	
E	0.587	0.594		0.587	0.594	
E <sub>1</sub>	0.547	0.551		0.547	0.551	
E <sub>2</sub>	0.488	0.531		0.488	0.531	
N	28			32		
N <sub>d</sub>	5			7		
N <sub>e</sub>	9			9		
CP	0.000	0.004		0.000	0.004	
TCP	0.000	0.004		0.000	0.004	
LT	0.009	0.015		0.009	0.015	

### 2.7.1.1 Principal Dimensions and Datums



### 2.7.1.2 Molded Details



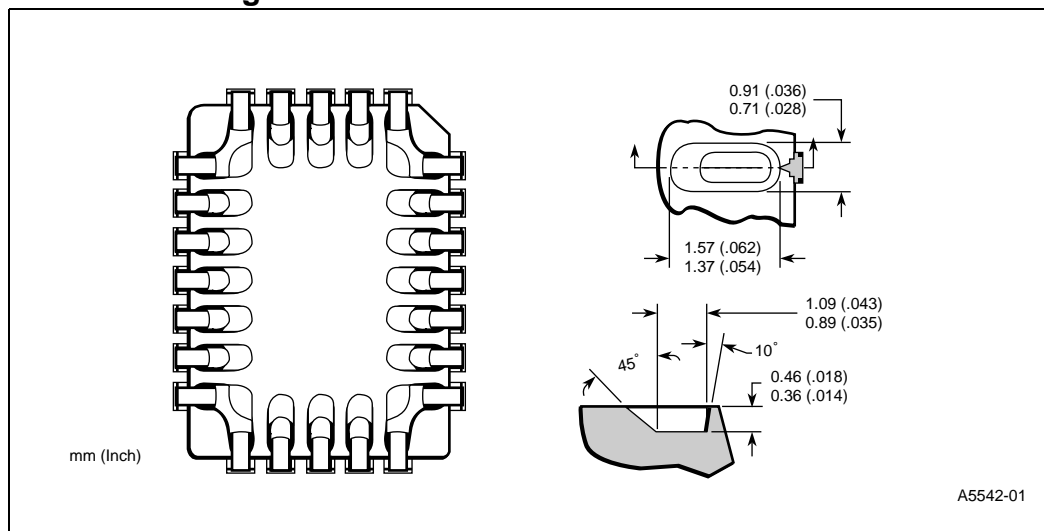
### 2.7.1.3 Terminal Details ND Side



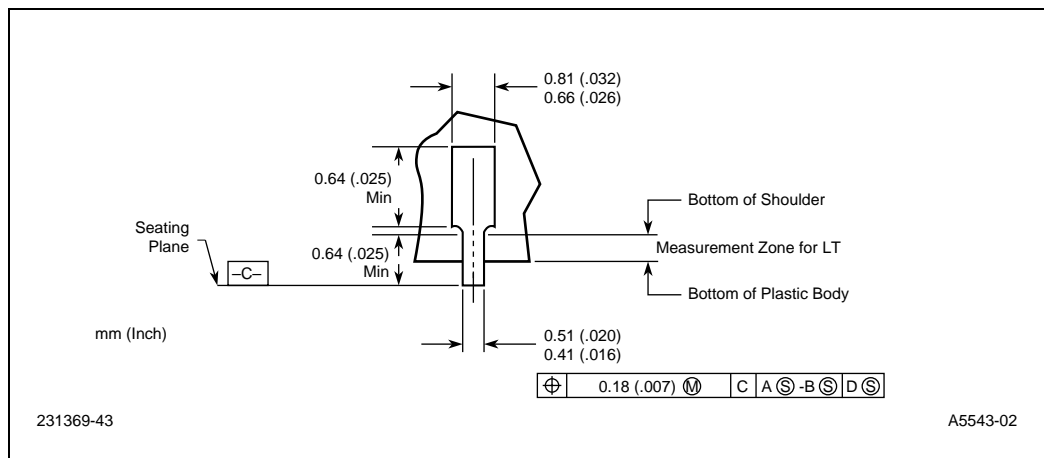
#### 2.7.1.4 Terminal Details NE Side



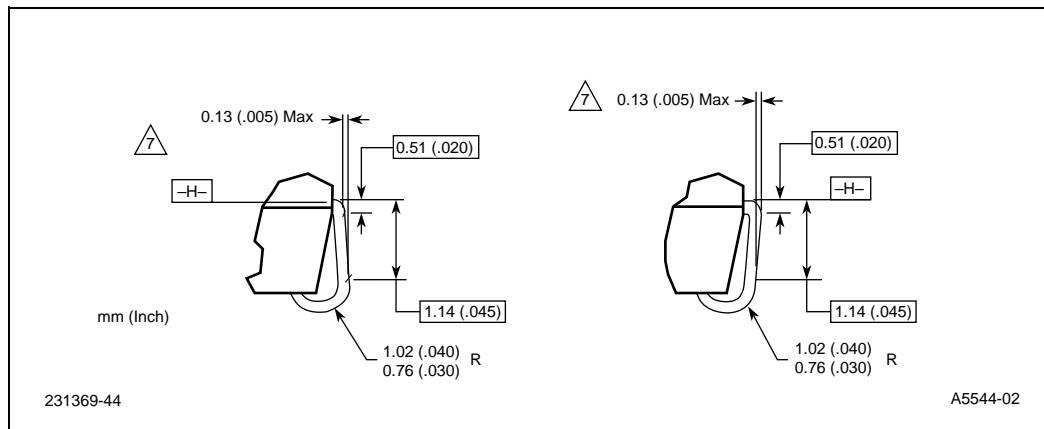
### 2.7.1.5 Standard Package Bottom View



### 2.7.1.6 Detail J. Terminal Details



### 2.7.1.7 Detail L. Terminal Detail



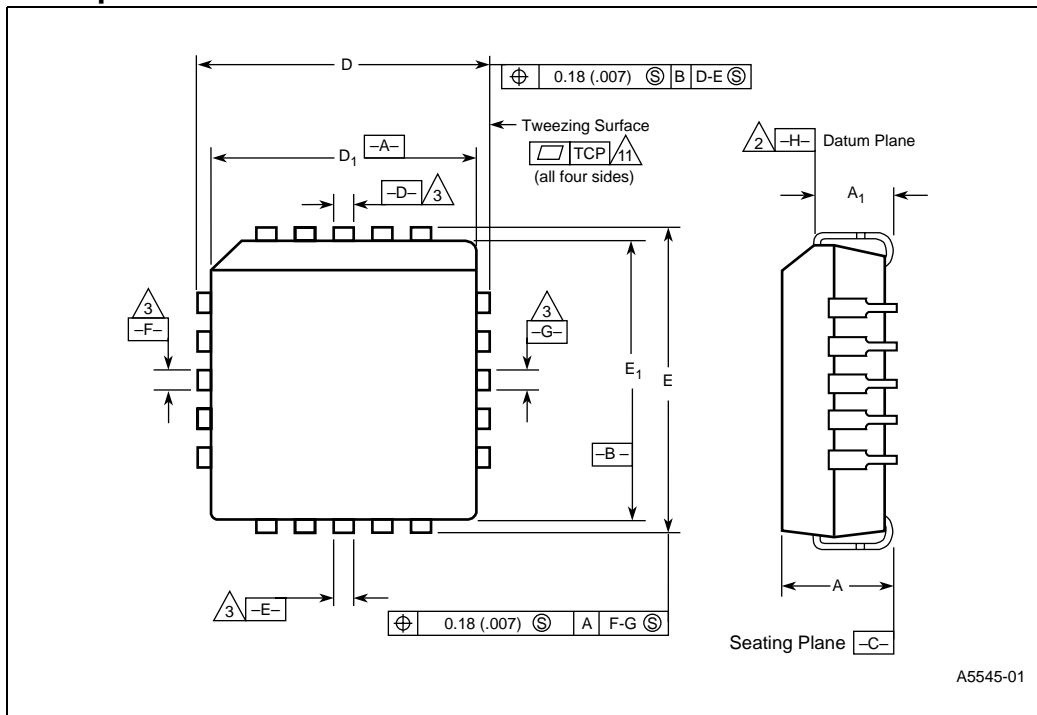
Family: Plastic Leaded Chip Carrier-Square (mm)						
Symbol	20 Lead			44 Lead		
	Min	Max	Notes	Min	Max	Notes
A	4.19	4.57		4.19	4.57	
A <sub>1</sub>	2.29	3.05		2.29	3.05	
D	9.78	10.0		17.4	17.7	
D <sub>1</sub>	8.89	9.04		16.5	16.7	
D <sub>2</sub>	7.37	8.38		15.0	16.0	
E	9.78	10.0		17.4	17.7	
E <sub>1</sub>	8.89	9.04		16.5	16.7	
E <sub>2</sub>	7.37	8.38		15.0	16.0	
N	20			44		
CP	0.00	0.10		0.00	0.10	
TCP	0.000	0.10		0.000	0.10	
LT	0.23	0.38		0.23	0.38	

Family: Plastic Leaded Chip Carrier-Square (inch)						
Symbol	20 Lead			44 Lead		
	Min	Max	Notes	Min	Max	Notes
A	0.165	0.180		0.165	0.180	
A <sub>1</sub>	0.090	0.120		0.090	0.120	
D	0.385	0.395		0.685	0.695	
D <sub>1</sub>	0.350	0.356		0.650	0.656	
D <sub>2</sub>	0.290	0.330		0.590	0.630	
E	0.385	0.395		0.685	0.695	
E <sub>1</sub>	0.350	0.356		0.650	0.656	
E <sub>2</sub>	0.290	0.330		0.590	0.630	
N	20			44		
CP	0.000	0.004		0.000	0.004	
TCP	0.000	0.004		0.000	0.004	
LT	0.009	0.015		0.009	0.015	

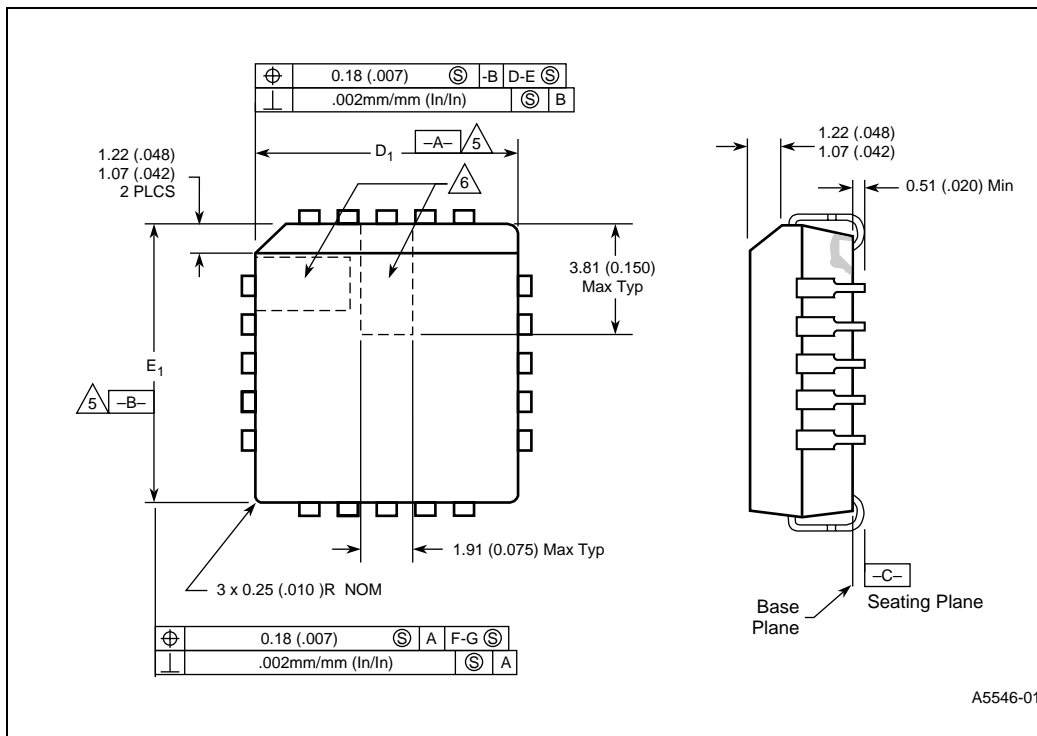
Family: Plastic Leaded Chip Carrier-Square (mm)									
Symbol	52 Lead			68 Lead			84 Lead		
	Min	Max	Notes	Min	Max	Notes	Min	Max	Notes
A	4.19	4.57		4.19	4.83		4.19	4.83	
A <sub>1</sub>	2.29	3.05		2.29	3.05		2.29	3.05	
D	19.90	20.20		25.00	25.30		30.10	30.40	
D <sub>1</sub>	19.10	19.20		24.10	24.30		29.20	29.40	
D <sub>2</sub>	17.50	18.50		22.60	23.60		27.70	28.70	
E	19.90	20.20		25.00	25.30		30.10	30.40	
E <sub>1</sub>	19.10	19.20		24.10	24.30		29.20	29.40	
E <sub>2</sub>	17.50	18.50		22.60	23.60		27.70	28.70	
N	52			68			84		
CP	0.00	0.10		0.00	0.10		0.00	0.10	
TCP	0.00	0.10		0.00	0.10		0.00	0.10	
LT	0.23	0.38		0.20	0.36		0.20	0.36	

Family: Plastic Leaded Chip Carrier-Square (inches)									
Symbol	52 Lead			68 Lead			84 Lead		
	Min	Max	Notes	Min	Max	Notes	Min	Max	Notes
A	0.165	0.180		0.165	0.190		0.165	0.190	
A <sub>1</sub>	0.090	0.120		0.090	0.120		0.090	0.120	
D	0.783	0.795		0.984	0.996		1.185	1.195	
D <sub>1</sub>	0.752	0.756		0.949	0.957		1.150	1.157	
D <sub>2</sub>	0.689	0.728		0.890	0.929		1.091	1.130	
E	0.783	0.795		0.984	0.996		1.185	1.195	
E <sub>1</sub>	0.752	0.756		0.949	0.957		1.150	1.157	
E <sub>2</sub>	0.689	0.728		0.890	0.929		1.091	1.130	
N	52			68			84		
CP	0.000	0.004		0.000	0.004		0.000	0.004	
TCP	0.000	0.004		0.000	0.004		0.000	0.004	
LT	0.009	0.015		0.008	0.014		0.008	0.014	

### 2.7.1.8 Principal Dimensions and Datums

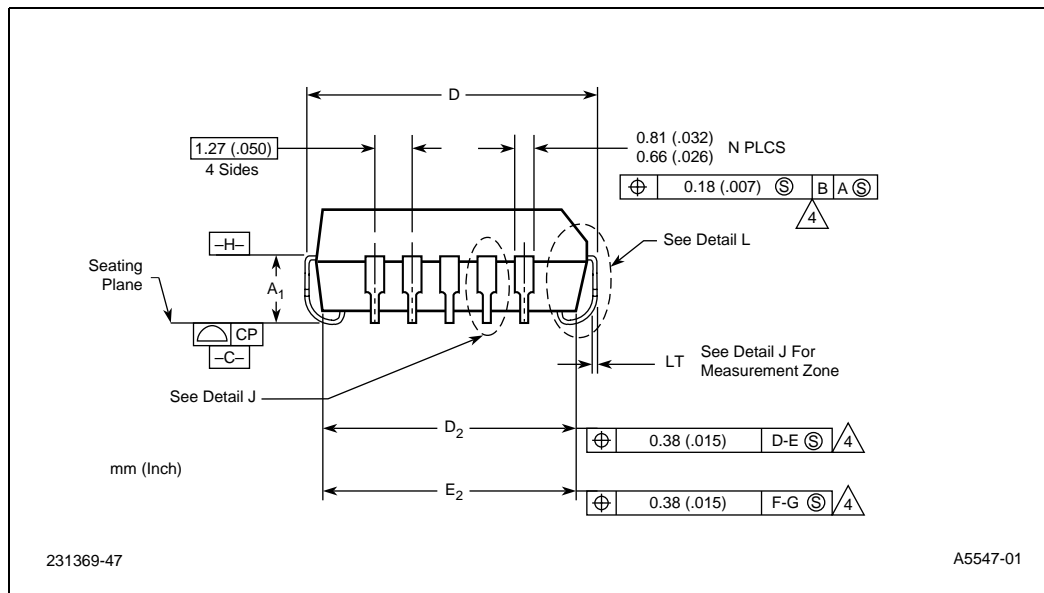


### 2.7.1.9 Molded Detail

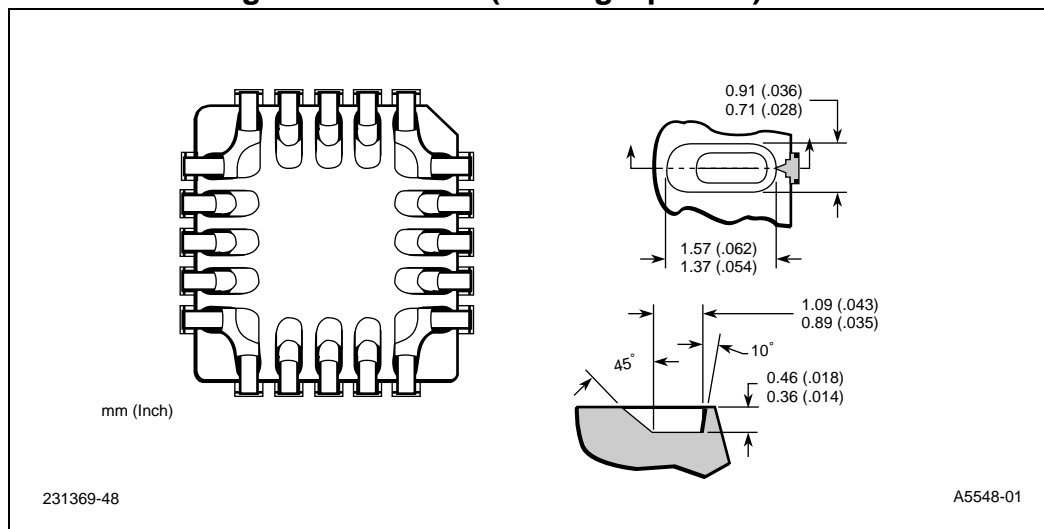


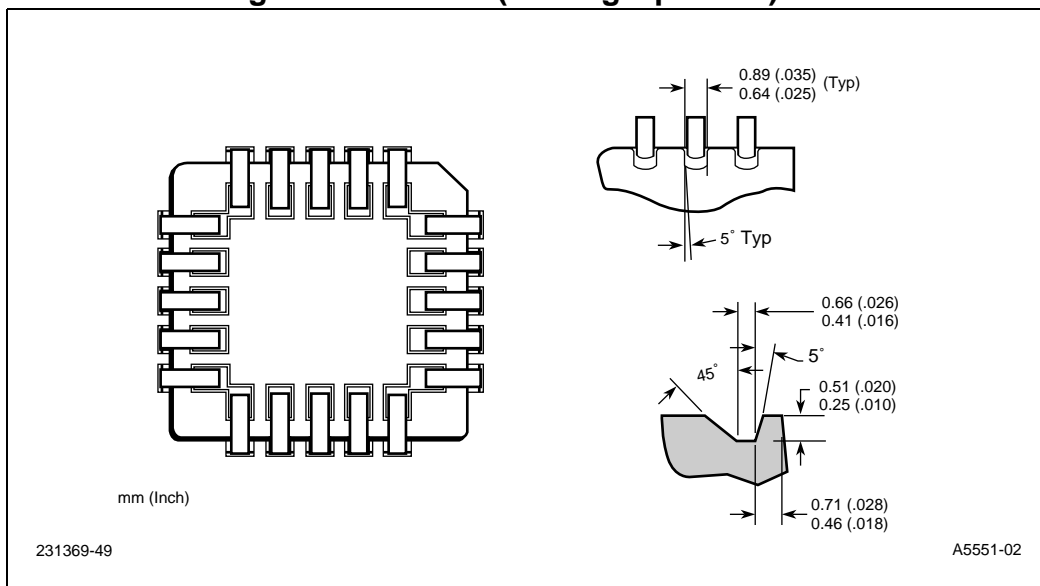
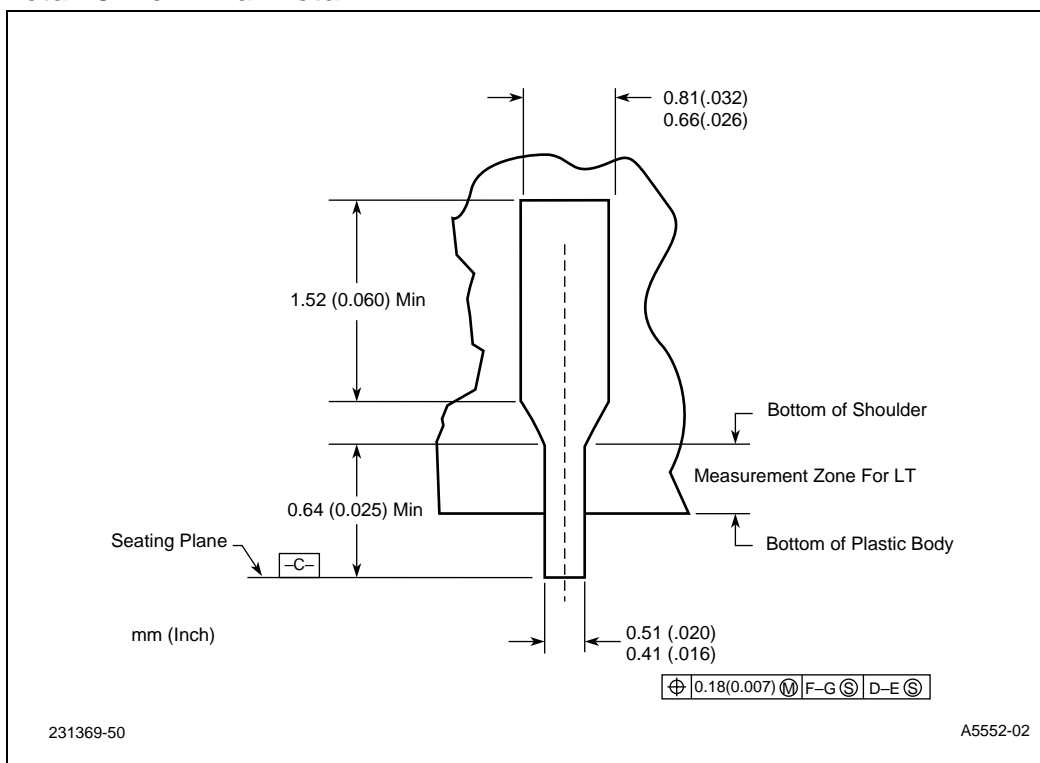


### 2.7.1.10 Terminal Details

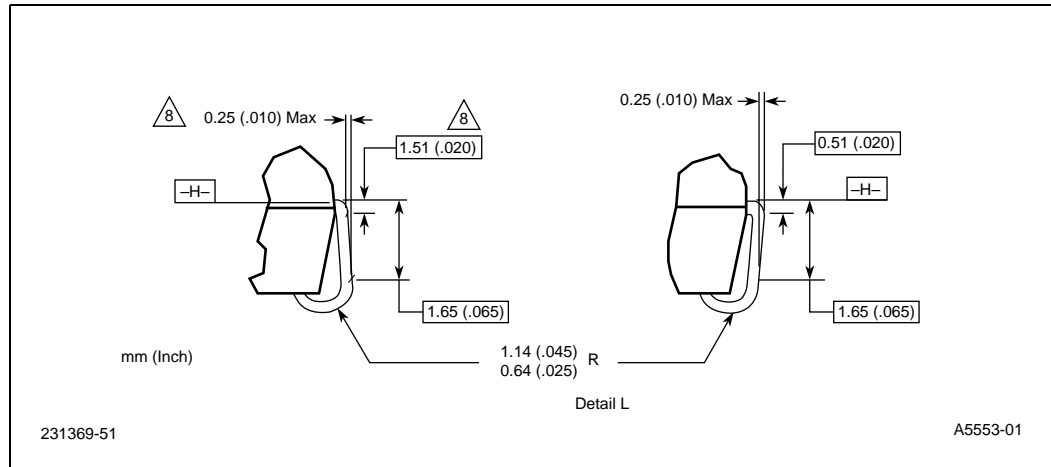


### 2.7.1.11 Standard Package Bottom View (Tooling Option I.)



**2.7.1.12 Standard Package Bottom View (Tooling Option II.)****2.7.1.13 Detail J. Terminal Detail**

### 2.7.1.14 Detail L. Terminal Details



#### NOTES: SQUARE PACKAGE

1. All dimensions and tolerances conform to ANSI Y 14.5M-1982.
2. Datum plane **-H-** located at top of mold parting line and coincident with top of lead, where lead exits plastic body.
3. Data **D-E** and **F-G** to be determined where center leads exit plastic body at datum plane **-H-**.
4. To be determined at seating plane **-C-**.
5. Dimensions  $D_1$  and  $E_1$  do not include mold protrusion.
6. Pin 1 identifier is located within one of the two defined zones.
7. Locations to datum **-A-** and **-B-** to be determined at plane **-H-**.
8. These two dimensions determine maximum angle of the lead of certain socket applications. If unit is intended to be socketed, it is advisable to review these dimensions with the socket supplier.
9. Controlling dimension, inch.
10. All dimensions and tolerances include lead trim offset and lead plating finish.
11. Tweezing surface planarity is defined as the furthest any lead on a side may be from the datum. The datum is established by touching the outermost lead on that side and parallel to **D-E** or **F-G**.

## 2.8 Plastic Quad Flatpack Package

### 2.8.1 Symbol List for Plastic Quad Flatpack Family

Symbol	Description
A	Package height
A <sub>1</sub>	Standoff
D, E	Terminal dimension
D <sub>1</sub> , E <sub>1</sub>	Package body
D <sub>1</sub> , E <sub>1</sub>	Foot print
D <sub>2</sub> , E <sub>2</sub>	Bumper distance
D <sub>2</sub> , E <sub>2</sub>	Foot radius location
L1	Foot length
N	Leadcount

**NOTES:**

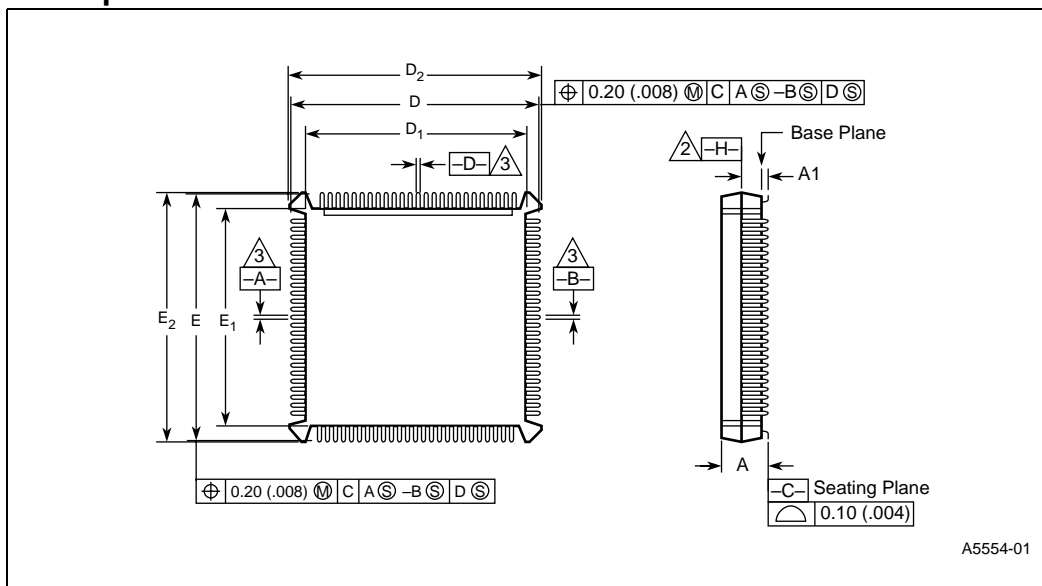
1. All dimensions and tolerances conform to ANSI Y 14.5M-1982.
2. Datum plane **-H-** located at top of mold parting line and coincident with top of lead, where lead exits plastic body.
3. Data **A-B** and **-D-** to be determined where center leads exit plastic body at datum plane **-H-**.
4. Controlling dimension, inch.
5. Dimensions D<sub>1</sub>, D<sub>2</sub>, E<sub>1</sub> and E<sub>2</sub> are measured at the mold parting line. D<sub>1</sub> and E<sub>1</sub> do not include an allowable mold protrusion of 0.25 mm (0.010 in) per side. D<sub>2</sub> and E<sub>2</sub> do not include a total allowable mold protrusion of 0.25 mm (0.010 in) at maximum package size.
6. Pin 1 identifier is located within one of the two zones indicated.
7. Measured at datum plane **-H-**.
8. Measured at seating plane datum **-C-**.

Packaging Family Attributes	
Category	Plastic Quad Flatpack
Acronym	PQFP
Lead Configuration	Gull-Wing
Lead Counts	84, 100, 132, 164, 196
Lead Finish	Solder Plate
Lead Pitch	0.025"
Board Assembly Type	Surface or Socket Mount

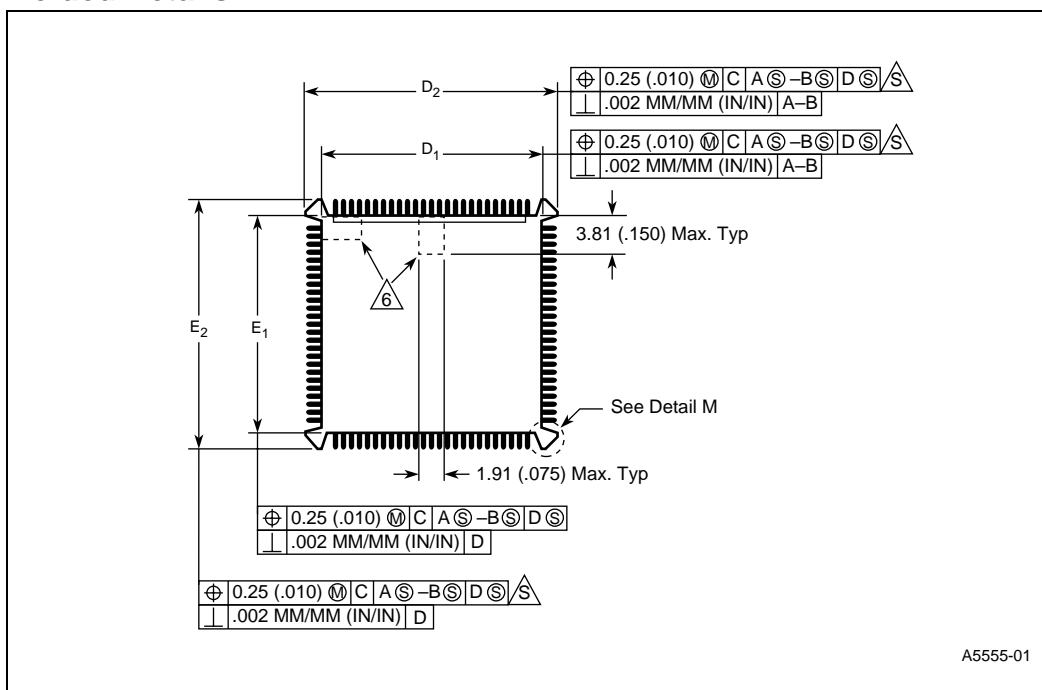
Plastic Quad Flatpack (PQFP) 0.025 Inch (0.635mm) Pitch											
Symbol	Description	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
A	Package Height	0.160	0.180	0.160	0.180	0.160	0.180	0.160	0.180	0.160	0.180
A <sub>1</sub>	Standoff	0.020	0.040	0.020	0.040	0.020	0.040	0.020	0.040	0.020	0.040
D,E	Terminal Dimension	0.770	0.790	0.870	0.890	1.070	1.090	1.270	1.290	1.470	1.490
D <sub>1</sub> , E <sub>1</sub>	Package Body	0.647	0.653	0.747	0.753	0.947	0.953	1.147	1.153	1.347	1.353
D <sub>2</sub> , E <sub>2</sub>	Bumper Distance	0.797	0.803	0.897	0.903	1.097	1.103	1.297	1.303	1.497	1.503
D <sub>3</sub> , E <sub>3</sub>	Lead Dimension	0.500 REF		0.600 REF		0.800 REF		1.000 REF		1.200 REF	
D <sub>4</sub> , E <sub>4</sub>	Foot Radius Location	0.723	0.737	0.823	0.837	1.023	1.037	1.223	1.237	1.423	1.437
L <sub>1</sub>	Foot Length	0.020	0.030	0.020	0.030	0.020	0.030	0.020	0.030	0.020	0.030
N	Leadcount	84		100		132		164		196	
	Controlling Dimensions in Inches										

Plastic Quad Flatpack (PQFP) 0.025 Inch (0.635mm) Pitch											
Symbol	Description	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
A	Package Height	4.06	4.57	4.06	4.57	4.06	4.57	4.06	4.57	4.06	4.57
A <sub>1</sub>	Standoff	0.51	1.02	0.51	1.02	0.51	1.02	0.51	1.02	0.51	1.02
D,E	Terminal Dimension	19.56	20.07	22.01	22.61	27.18	27.69	32.26	32.77	37.34	37.85
D <sub>1</sub> , E <sub>1</sub>	Package Body	16.43	16.59	18.97	19.13	24.05	24.21	29.13	29.29	34.21	34.37
D <sub>2</sub> , E <sub>2</sub>	Bumper Distance	20.24	20.39	22.78	22.93	27.86	28.01	32.94	33.09	38.02	38.18
D <sub>3</sub> , E <sub>3</sub>	Lead Dimension	12.70 REF		15.24 REF		20.32 REF		25.40 REF		30.48 REF	
D <sub>4</sub> , E <sub>4</sub>	Foot Radius Location	18.36	18.71	20.90	21.25	25.89	26.33	31.06	31.41	36.14	36.49
L <sub>1</sub>	Foot Length	0.51	0.76	0.51	0.76	0.51	0.76	0.51	0.76	0.51	0.76
N	Leadcount	84		100		132		164		196	
	Controlling Dimensions in mm										

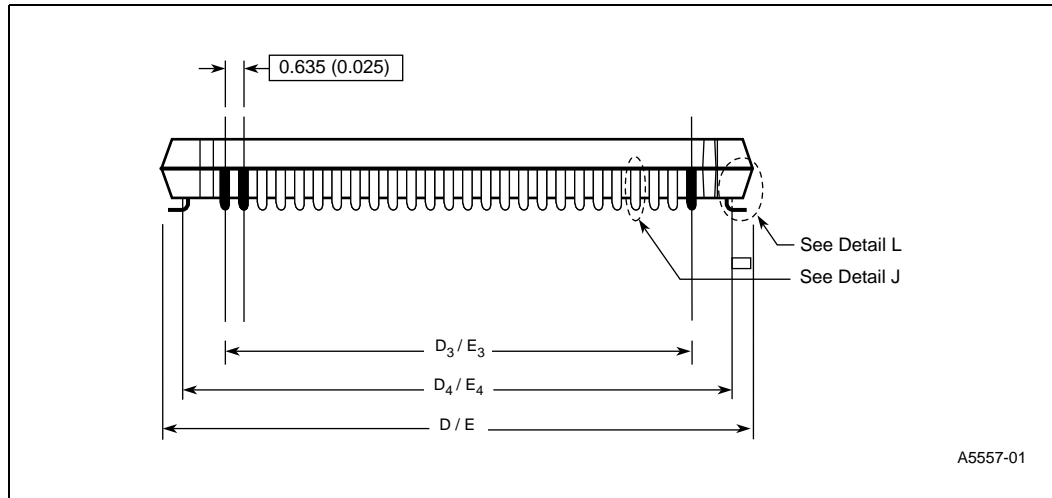
### 2.8.1.1 Principal Dimensions and Datums



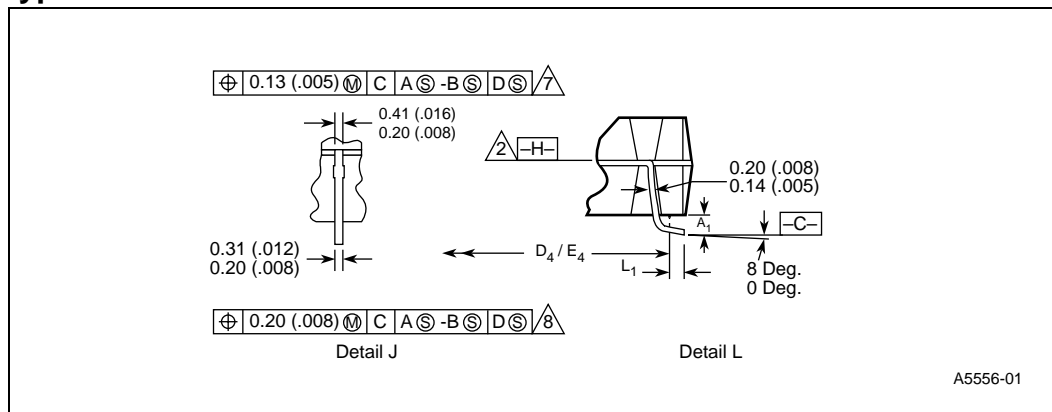
### 2.8.1.2 Molded Details



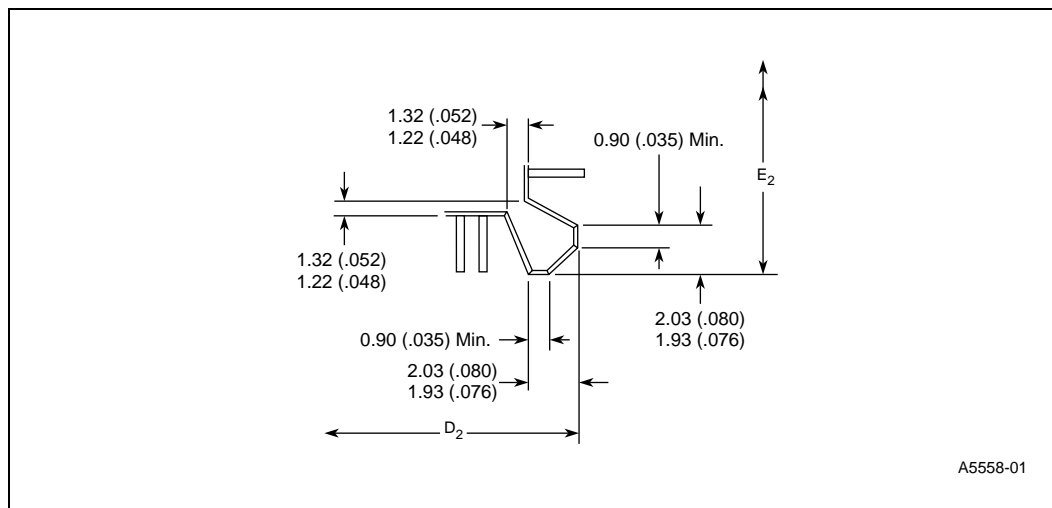
### 2.8.1.3 Terminal Details



### 2.8.1.4 Typical Lead



### 2.8.1.5 Detail M



## 2.9 Quad Flatpack Package

### 2.9.1 Symbol List for Quad Flatpack Family

Letter or Symbol	Description of Dimensions
A	Overall Height
A <sub>1</sub>	Standoff
AAA	Lead True Position
b	Lead Width
c	Lead Thickness
D	Terminal Dimension
D <sub>1</sub>	Body Package
E	Terminal Dimension
E <sub>1</sub>	Body Package
e <sub>1</sub>	Lead Pitch
L <sub>1</sub>	Foot Length
N	Leadcount
T	Lead Angle
Y	Coplanarity

**NOTE: RECTANGLE PACKAGE**

1. Not all packages are available with all products. Contact local Intel Representative for further package information.

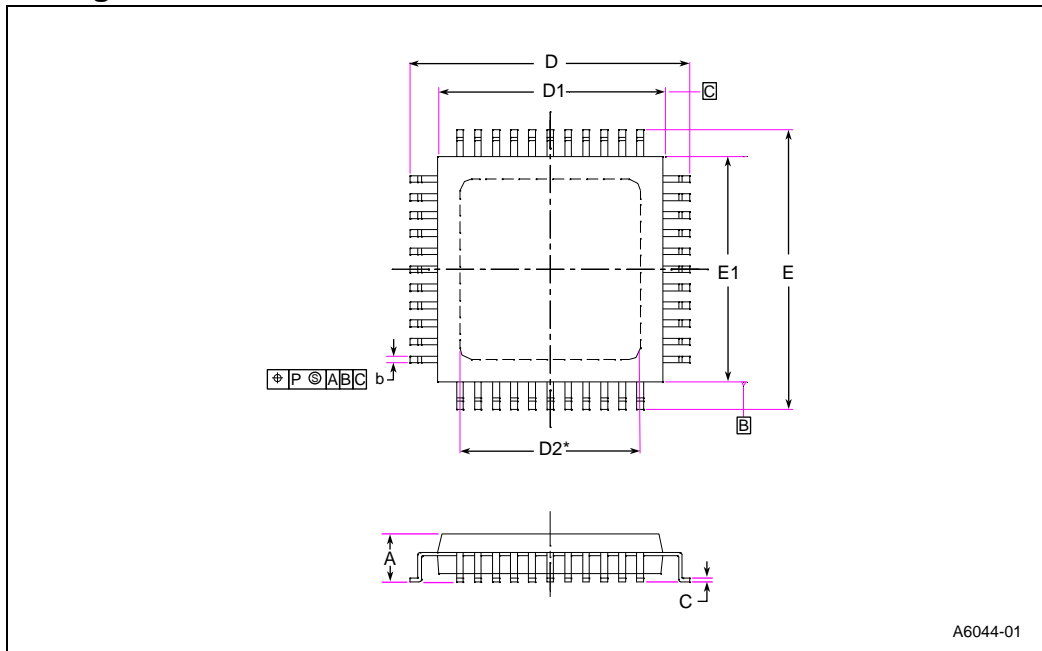
Packaging Family Attributes	
Category	Quad Flatpack
Acronym	QFP, SQFP, TQFP
Lead Configuration	Quad
Lead Counts	QFP 44, 48, 64, 80, 100, 160 - SQFP 80, 100, 128, 208 - TQFP 100, 144, 176
Lead Finish	Solder Plate
Lead Pitch	0.5, 0.65, 0.8 mm
Board Assembly Type	Surface or Socket Mount

**NOTES:**

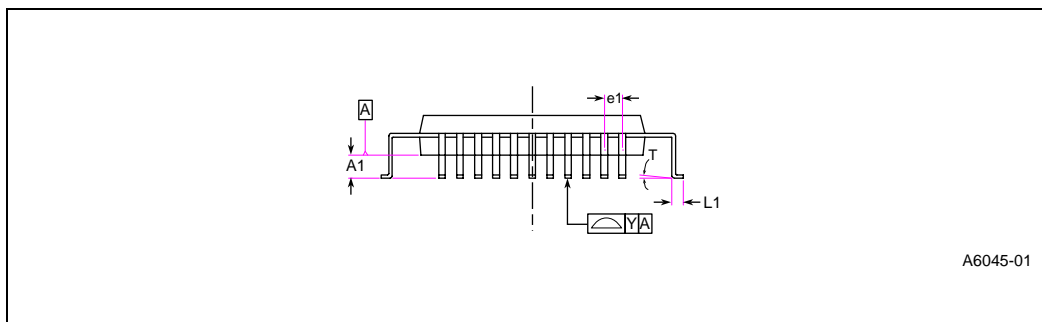
1. QFP - Alloy 42/copper on some lead frames. SQFP / TQFP copper lead frames only.
2. Novalac Body.
3. Not all packages are available with all products. Contact local Intel Representative for further package information.



### 2.9.1.1 Principal Dimensions and Data for QFP (Square)/TQFP/SQFP Packages



### 2.9.1.2 Terminal Details



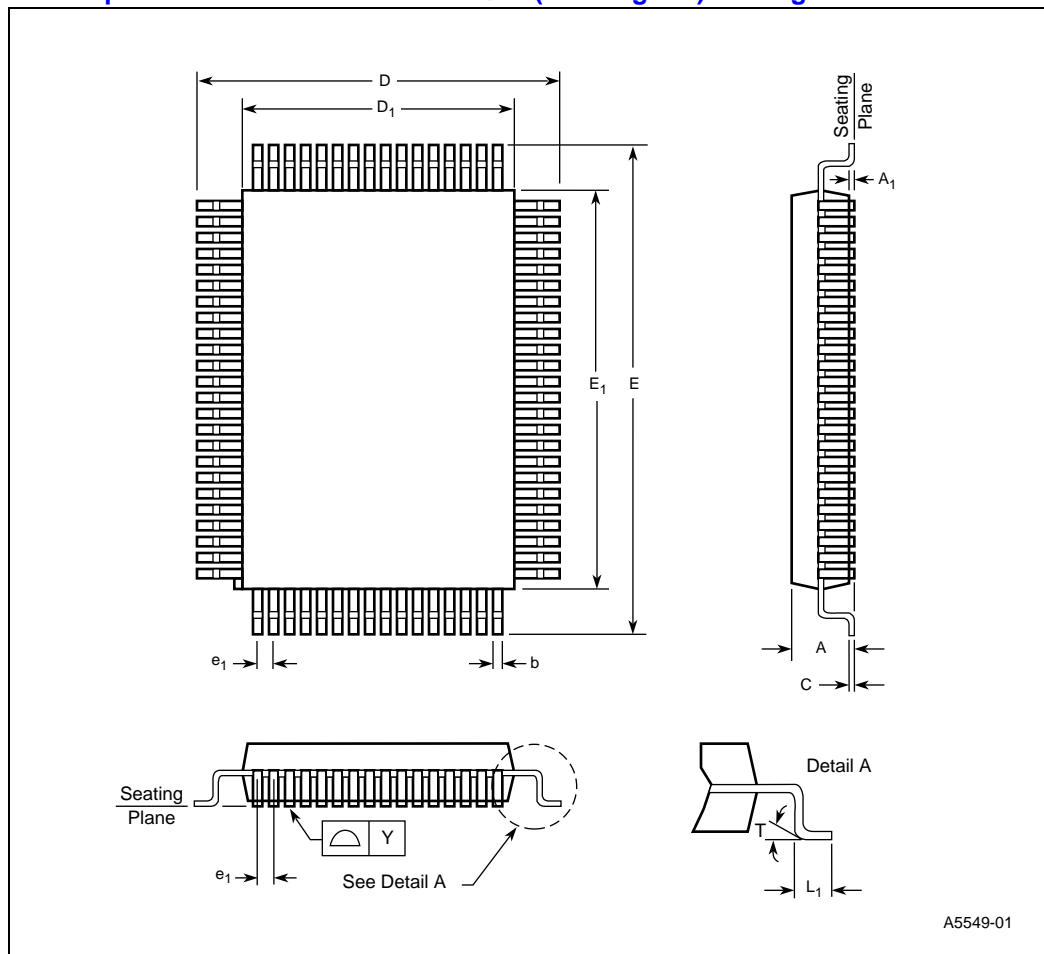
Quad Flatpack (Square Packages)							
Symbol	Description	Min	Nom	Max	Min	Nom	Max
N	Lead Count	44			48		
A	Overall Height			2.35			2.55
A <sub>1</sub>	Stand Off	0.05			0.05		0.25
b	Lead Width	0.20	0.30	.040	0.25	0.30	0.40
c	Lead Thickness	0.10	0.15	0.20	0.11	0.15	0.20
D	Terminal Dimension	12.0	12.4	12.8	15.1	15.3	15.5
D <sub>1</sub>	Package Body		10.0		11.9	12.0	12.1
E	Terminal Dimension	12.0	12.4	12.8	15.1	15.3	15.5
E <sub>1</sub>	Package Body		10.0		11.9	12.0	12.1
e <sub>1</sub>	Lead Pitch	0.65	0.80	0.95	0.70	0.80	0.90
L <sub>1</sub>	Foot Length	0.38	0.58	0.78	0.65	0.85	1.05
T	Lead Angle	0.0°		10.0°	0.0°		7.0°
Y	Coplanarity			0.10			0.10

Quad Flatpack (Square Packages) (Continued)								
Symbol	Description	Min	Nom	Max	Min	Max	Min	Max
N	Lead Count	64			128		160	
A	Overall Height			2.55	3.23	3.75		4.00
A <sub>1</sub>	Stand Off	0.05			0.05	0.30	0.05	0.30
b	Lead Width	0.20	0.30	0.40	0.25	0.45	0.20	0.45
c	Lead Thickness	0.10	0.15	0.20	0.150	0.188	0.150	0.188
D	Terminal Dimension	14.9	15.3	15.7	31.6	32.4	30.2	31.0
D <sub>1</sub>	Package Body		12.0		27.9	28.1	27.9	28.1
E	Terminal Dimension	14.9	15.3	15.7	31.6	32.4	30.2	31.0
E <sub>1</sub>	Package Body		12.0		27.9	28.1	27.9	28.1
e <sub>1</sub>	Lead Pitch	0.53	0.65	0.77	0.70	0.90	0.55	0.75
L <sub>1</sub>	Foot Length	0.65	0.85	1.05	0.60	1.0	0.60	1.0
T	Lead Angle	0.0°		10.0°	0°	10°	0°	10°
Y	Coplanarity			0.10	0.1		0.1	

Shrink Quad Flatpack												
Symbol	Description	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Max
A	Overall Height			1.7			1.7			3.15		3.75
A <sub>1</sub>	Stand Off	0.00			0.00			0.05		0.40	0.05	0.30
b	Lead Width	0.14	0.20	0.26	0.14	0.20	0.26	0.14	0.22	0.28	0.14	0.26
c	Lead Thickness	0.117	0.127	0.177	0.117	0.127	0.177	0.10	0.15	0.20	0.150	0.188
D	Terminal Dimension	13.70	14.00	14.30	15.70	16.00	16.30	17.5	17.9	18.3	30.2	31.0
D <sub>1</sub>	Package Body		12.0			14.00			14.0		27.9	28.1
E	Terminal Dimension	13.70	14.00	14.30	15.70	16.00	16.30	23.5	23.9	24.3	30.2	31.0
E <sub>1</sub>	Package Body		12.0			14.00			20.0		27.9	28.1
e <sub>1</sub>	Lead Pitch	0.40	0.50	0.60	0.40	0.50	0.60	0.40	0.50	0.60	0.40	0.60
L <sub>1</sub>	Foot Length	0.35	0.50	0.70	0.30	0.50	0.70	0.60	0.80	1.00	0.30	0.70
N	Lead Count	80			100			128			208	
T	Lead Angle	0.0°		10.0°	0.0°		10.0°	0.0°		10.0°	0.0°	10.0°
Y	Coplanarity			0.10			0.10			0.10	0.08	
D <sub>2</sub> /E <sub>2</sub>	Heatspreader										21	

Thin Quad Flatpack							
Symbol	Description	Min	Max	Min	Max	Min	Max
A	Overall Height		1.7	1.3	1.7	1.3	1.7
A <sub>1</sub>	Stand Off	0.05	0.20	0.05	0.20	0.50	
b	Lead Width	0.16	0.28	0.16	0.28	0.16	0.28
c	Lead Thickness	0.117	0.127	0.122	0.160	0.122	0.160
D	Terminal Dimension	15.70	16.30	21.6	22.4	25.6	26.4
D <sub>1</sub>	Package Body	13.9	14.1	19.9	20.1	23.9	24.1
E	Terminal Dimension	15.7	16.30	21.6	22.4	25.6	26.4
E <sub>1</sub>	Package Body	13.9	14.1	19.9	20.1	23.9	24.1
e <sub>1</sub>	Lead Pitch	0.40	0.60	0.40	0.60	0.40	0.60
L <sub>1</sub>	Foot Length	0.30	0.70	0.40	0.80	0.40	0.80
N	Lead Count	100		144		176	
P	Leads True Position	0.08		0.08		0.08	
T	Lead Angle	0.0°	10.0°	0.0°	10.0°	0.0°	1.0°
Y	Coplanarity	0.10		0.08		0.08	

Figure 2-1. Principle Dimensions and Data for QFP (Rectangular) Packages



Quad Flatpack (Rectangular Packages)							
Symbol	Description	Min	Nom	Max	Min	Nom	Max
N	Lead Count	80			100		
A	Overall Height			3.15			3.15
A <sub>1</sub>	Stand Off	0.05		0.40	0.05		0.40
B	Lead Width	0.25	0.35	0.45	0.20	0.30	0.40
C	Lead Thickness	0.10	0.15	0.20	0.10	0.15	0.20
D	Terminal Dimension	17.5	17.9	18.3	17.5	17.9	18.3
D <sub>1</sub>	Package Body		14.0			14.0	
E	Terminal Dimension	23.5	23.9	24.3	23.5	23.9	24.3
E <sub>1</sub>	Package Body		20.0			20.0	
e <sub>1</sub>	Lead Pitch	0.65	0.80	0.95	0.53	0.65	0.77
L <sub>1</sub>	Foot Length	0.60	0.80	1.00	0.60	0.80	1.00
T	Lead Angle	0.0°		10.0°	0.0°		10.0°
Y	Coplanarity			0.10			0.10

## 2.10 Small Out-line J-lead Package (SOJ)

### 2.10.1 Symbol List for Small Out-Line J-Lead Family

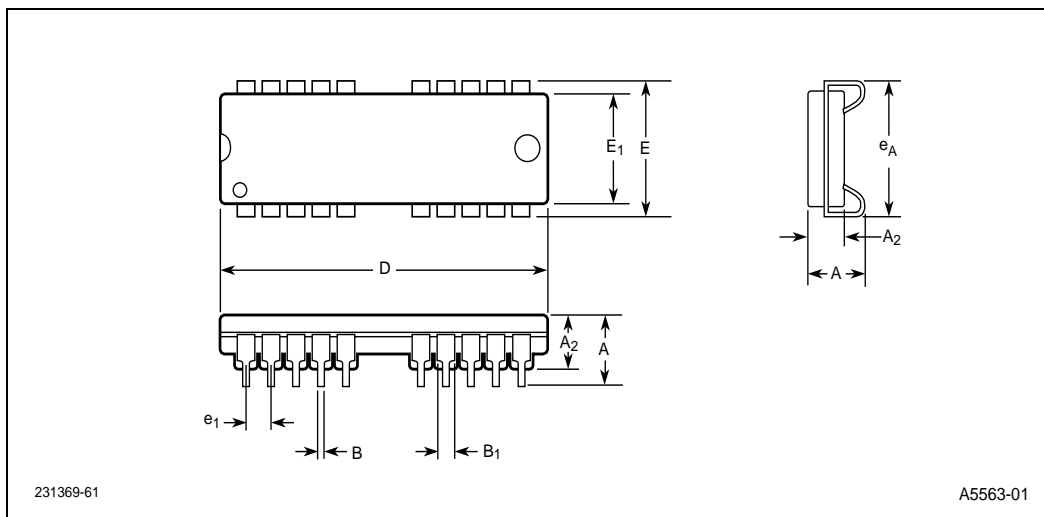
Letter or Symbol	Description of Dimensions
A	Overall Height
A <sub>2</sub>	Distance from Base Plane to Highest Point of Body (Lid)
B	Width of Terminal Leads
B <sub>1</sub>	Width of Terminal Lead Shoulder Which Locate Seating Plane (Standoff Geometry Optional)
D	Largest Overall Package Dimension of Length
E	Largest Over Package Width Dimension Outside of Leads
E <sub>1</sub>	Body Width Dimension Not Including Leads
e <sub>1</sub>	Linear Spacing Between Center Line of Body Terminal Leads (Standoffs)
e <sub>A</sub>	Linear Spacing of True Minimum Lead Position Center Line to Center Line
N	Total Number of Potentially Usable Lead Positions

Packaging Family Attributes	
Category	Small Outline J-Lead
Acronym	SOJ
Lead Configuration	Dual-In-Line
Lead Counts	20, 24
Lead Finish	Solder Plate
Lead Pitch	0.050"
Board Assembly Type	Surface Mount

**NOTES:**

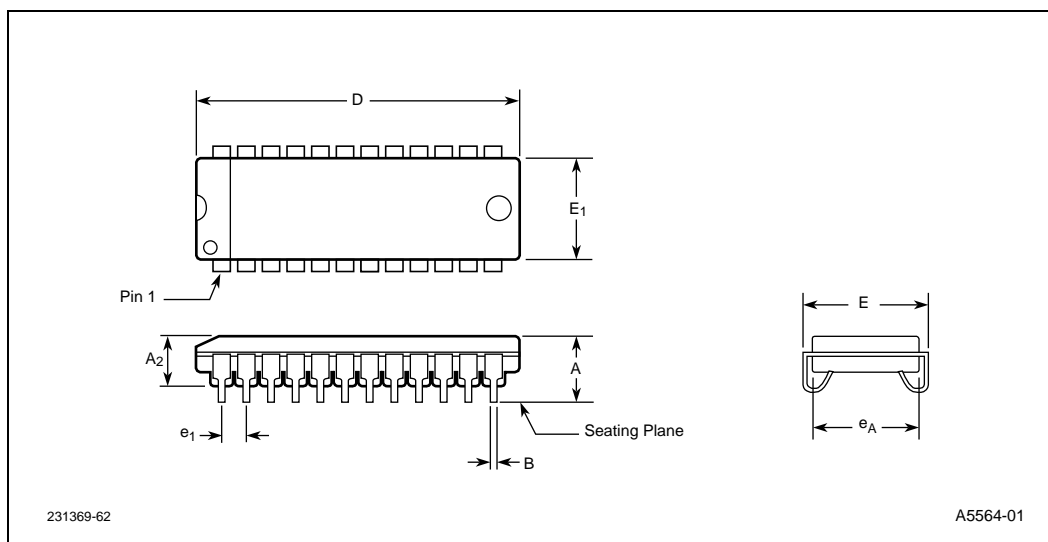
1. Alloy 42 Leads.
2. Novalac body.

## 2.10.2 20 Lead Small Out-Line Package (SOJ) Variation: J-Lead



Family: Small Out-Line J-Lead Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	3.04	3.61		0.120	0.142	
A <sub>2</sub>	2.36	3.00		0.093	0.118	
B	0.38	0.51		0.015	0.020	
B <sub>1</sub>	0.58	0.84		0.023	0.033	
D	17.02	17.27		0.67	0.680	
E	8.31	8.64		0.327	0.340	
E <sub>1</sub>	7.49	7.75		0.295	0.305	
e <sub>1</sub>	1.27		Typical	0.050		Typical
e <sub>A</sub>	6.60	6.99		0.260	0.275	
e <sub>B</sub>	7.62	10.16		0.300	0.400	
N	20			20		

### 2.10.3 24 Lead Small Out-Line Package (SOJ) Variation: J-Lead



Family: Small Out-Line J-Lead Package						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
A	3.35	3.61		0.132	0.142	
A <sub>1</sub>						
A <sub>2</sub>	2.74	3.00		0.180	0.118	
A <sub>3</sub>						
B	0.38	0.51		0.015	0.020	
D	15.75	16.18		0.620	0.637	
D <sub>2</sub>						
E	8.38	8.64		0.330	0.340	
E <sub>1</sub>	7.49	7.75		0.295	0.305	
e <sub>1</sub>	1.27		Typical	0.050		Typical
e <sub>A</sub>	6.60	6.99		0.260	0.275	
e <sub>B</sub>						
L						
N	24			24		

## 2.10.4 Plastic Small Out-Line Package/Shrink Small Outline Package (PSOP/SSOP)

Letter or Symbol	Description of Dimensions
A	Overall Height
A <sub>1</sub>	Standoff
A <sub>2</sub>	Package Body Thickness
A <sub>3</sub>	Lead Height
b	Width of Terminal Leads
c	Thickness of Terminal Leads
D <sub>1</sub>	Plastic Body Length
E	Package Body Width
e	Lead Pitch
D	Terminal Dimension
L	Lead Tip Length
N	Total Number of Potentially Usable Lead Positions
Y	Seating Plane Coplanarity
Z	Lead to Package Offset
Ø	Lead Tip Angle

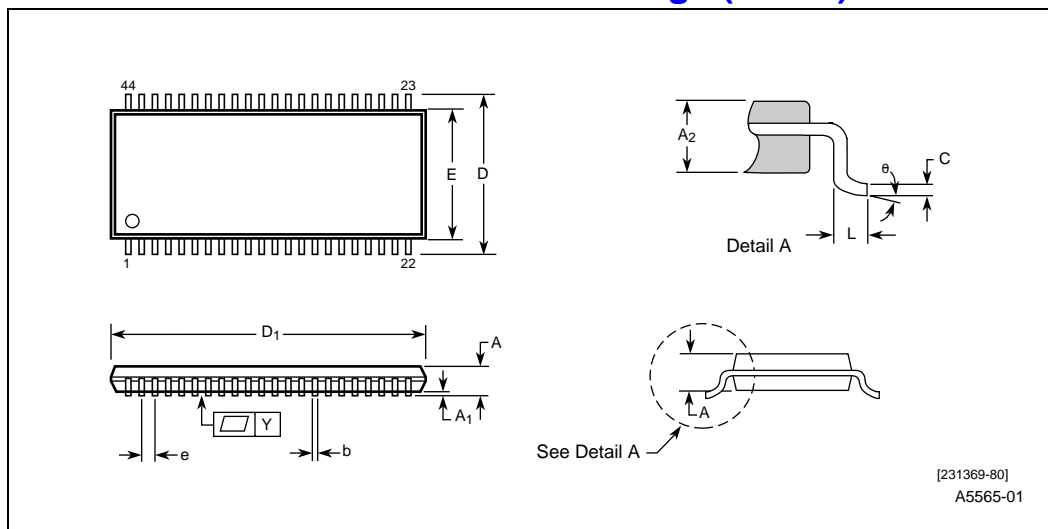
Packaging Family Attributes	
Category	Plastic Small Outline Package/Shrink Small Outline Package
Acronym	PSOP/SSOP
Lead Counts	44/48 & 56
Lead Finish	Solder Plate
Lead Pitch	1.27 mm/0.8 mm
Board Assembly Type	Surface Mount
Standard Registration	JEDEC and EIAJ

**NOTES:**

1. Copper Alloy 194.
2. Novalac body.
3. Profile Tolerance zones for D1 and E do not include mold protrusion. (Allowable mold protrusion on D1 is 0.25 mm per side and on E is 0.15 mm per side.)
4. Lead Plating Thickness is 0.007 mm - 0.015 mm (Not part of b or c dimensions).

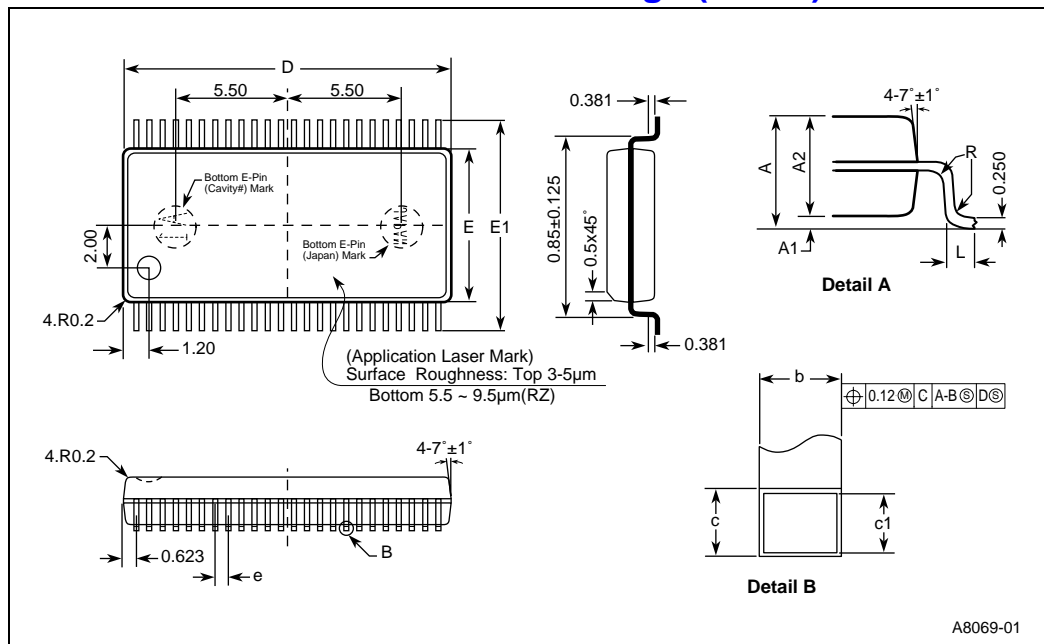


## 2.10.5 44 Lead Plastic Small Out-Line Package (PSOP)



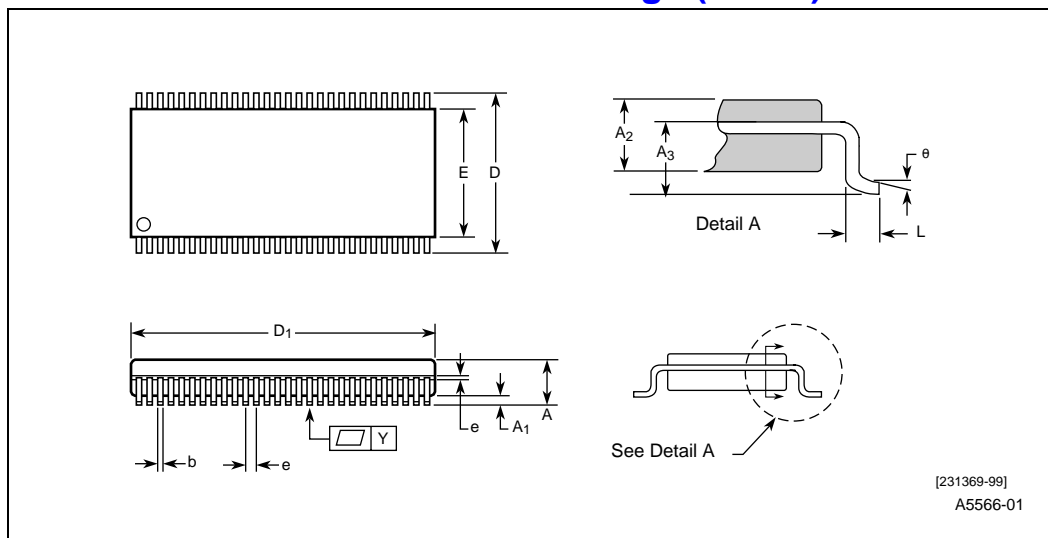
Family: Small Out-Line Package								
Symbol	Millimeters			Notes	Inches			Notes
	Min	Nom	Max		Min	Nom	Max	
A			2.95				0.116	
A <sub>1</sub>	0.050				0.020			
A <sub>2</sub>	2.20	2.30	2.40		0.087	0.091	0.094	
b	0.35	0.40	0.50		0.014	0.016	0.020	
c	0.13	0.150	0.20		0.005	0.006	0.008	
D <sub>1</sub>	28.00	28.20	28.40	3	1.102	1.110	1.118	3
E	13.10	13.30	13.50	3	0.516	0.524	0.531	3
e		1.27				0.050		
D	15.75	16.00	16.25		0.620	0.630	0.640	
L	0.75	0.80	0.85		0.030	0.031	0.033	
Y			0.10				0.004	
Ø			8°				8°	

## 2.10.6 48-Lead Shrink Small Outline Package (SSOP)



48L Small Outline Package			
Symbol	Millimeters		
	Min	Nom	Max
A	2.44	2.59	2.74
A <sub>1</sub>	0.20	0.30	0.40
A <sub>2</sub>	2.24	2.29	2.34
b	0.22		0.30
b <sub>1</sub>	0.22	0.25	0.28
c	0.18		0.25
c <sub>1</sub>	0.18	0.20	0.22
D	15.80	15.85	15.90
E	7.45	7.50	7.55
E <sub>1</sub>	10.16	10.285	10.41
L	0.70	0.80	0.90
e	0.635 BSC		
R	0.10	0.20	0.30
θ <sub>1</sub>	0	5	8
θ <sub>2</sub>	0	3	6

## 2.10.7 56-Lead Shrink Small Outline Package (SSOP)



56L Small Outline Package									
	Symbol	Millimeters			Notes	Inches			Notes
		Min	Nom	Max		Min	Nom	Max	
Package height	A		1.80	1.90			0.070	0.075	
Standoff	A <sub>1</sub>	0.47				0.018			
Package body thickness	A <sub>2</sub>	1.18	1.28	1.38		0.046	0.050	0.054	
Lead width	b	0.25	0.30	0.40		0.010	0.012	0.016	
Lead thickness	c	0.13	0.15	0.20		0.005	0.006	0.008	
Plastic body length	D <sub>1</sub>	23.40	23.70	24.00	3	0.921	0.933	0.945	3
Package body width	E	13.10	13.30	13.50	3	0.516	0.524	0.531	3
Lead pitch	e		0.80				0.0315		
Terminal dimension	D	15.70	16.00	16.30		0.618	0.630	0.642	
Lead count	N		56				56		
Lead tip length	L	0.750	0.80	0.85		0.030	0.315	0.033	
Seating plane coplanarity	Y			0.10				0.004	
Lead height	A <sub>3</sub>	1.30	1.40	1.50		0.051	0.055	0.059	
Lead tip angle	Ø			5°				5°	

## 2.11 Thin Small Out-line Package (TSOP)

**Note:** For more SOP package information refer to SOP package guide Order #296514.

### 2.11.1 Symbol List for Thin Small Out-Line Package Family

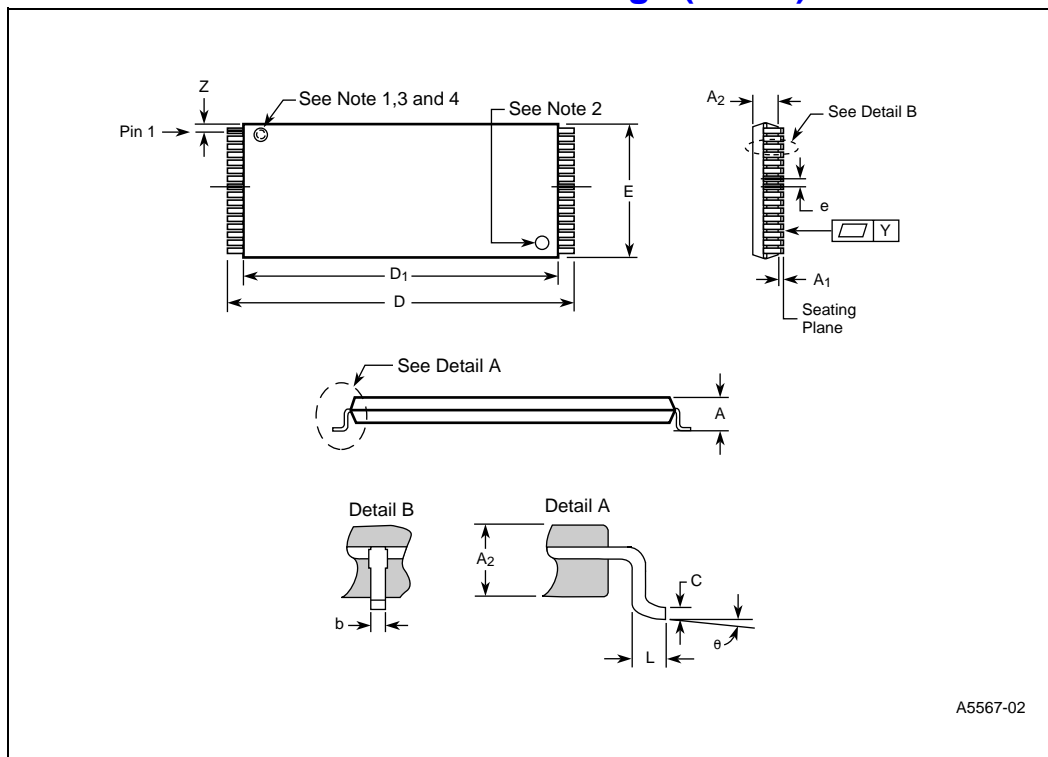
Letter or Symbol	Description of Dimensions
A	Overall Height
A <sub>1</sub>	Standoff
A <sub>2</sub>	Package Body Thickness
A <sub>3</sub>	Lead Height
b	Width of Terminal Leads
c	Thickness of Terminal Leads
D	Terminal Dimension
D <sub>1</sub>	Plastic Body Length
E	Package Body Width
e	Lead Pitch
L	Lead Foot Length
N	Total Number of Potentially Usable Lead Positions
Y	Seating Plane Coplanarity
Z	Lead to Package Offset
Ø	Lead Tip Angle

Packaging Family Attributes	
Category	Thin Small Out-Line Package
Acronym	TSOP
Lead Configuration	Dual-In-Line, Type I
Lead Counts	32, 40, 48, 56
Lead Finish	Solder Plate
Lead Pitch	0.5 mm
Board Assembly Type	Surface Mount

**NOTES:**

1. Alloy 42 Leads.
2. Novalac body.
3. Offered in Reverse Pin-Out for special circuit layout, (32L, 40L only).
4. Profile Tolerance zones for D<sub>1</sub> and E do not include mold protrusion. (Allowable mold protrusion on D<sub>1</sub> is 0.25 mm per side and on E is 0.15 mm per side.)
5. Lead plating thickness is 0.007 mm - 0.015 mm (Not part of b or c dimensions).

## 2.11.2 32-Lead Thin Small Out-Line Package (TSOP)

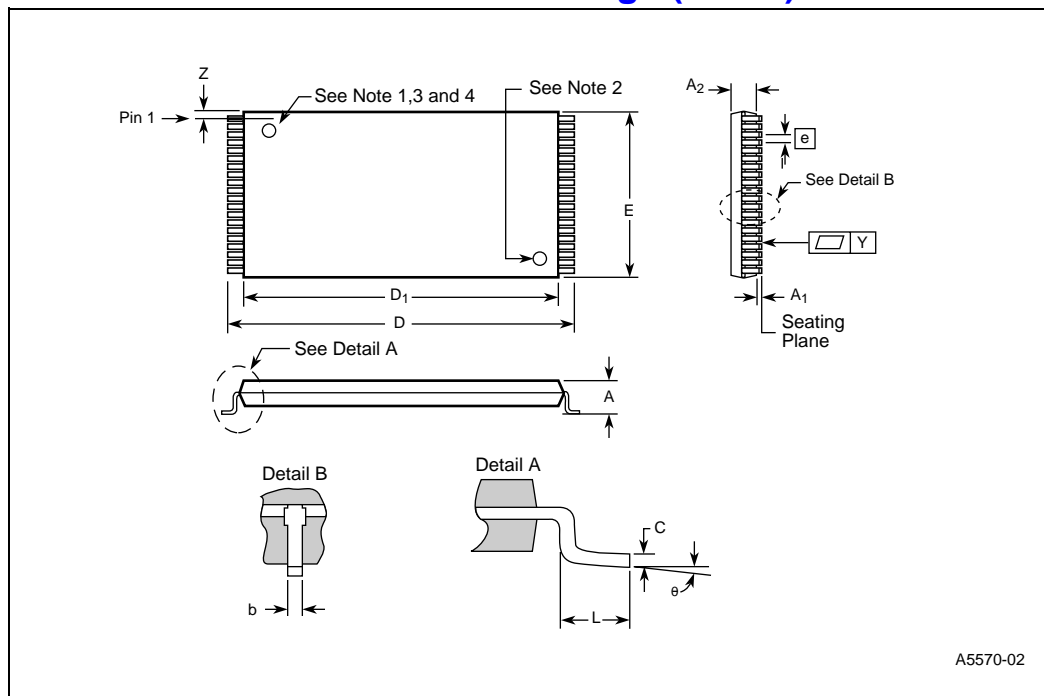


Family: Thin Small Out-Line Package								
Symbol	Millimeters			Notes	Inches			Notes
	Min	Nom	Max		Min	Nom	Max	
A			1.200				0.047	
A <sub>1</sub>	0.050				0.002			
A <sub>2</sub>	0.965	0.995	1.025		0.038	0.039	0.040	
B	0.150	0.200	0.300		0.006	0.008	0.012	
C	0.115	0.125	0.135		0.004	0.0049	0.0053	
D	19.800	20.000	20.200		0.780	0.787	0.795	
D <sub>1</sub>	18.200	18.400	18.600	4	0.717	0.724	0.732	4
E	7.800	8.000	8.200	4	0.307	0.315	0.323	4
e		0.500				0.0197		
L	0.500	0.600	0.700		0.020	0.024	0.028	
N		32				32		
Ø	0°	3°	5°		0°	3°	5°	
Y			0.100				0.004	
Z	0.150	0.250	0.350		0.006	0.010	0.014	

**NOTES:**

1. One dimple on package denotes Pin 1.
2. If two dimples, then the larger dimple denotes Pin 1.
3. Pin 1 will always be in the upper left corner of the package, in reference to the product mark.
4. Package/Tray orientation: Package pin 1 will always be orientated towards the chamfer tray side (Dimension Z) as per JEDEC standard JEP-95, CS-008.

### 2.11.3 40-Lead Thin Small Out-line Package (TSOP)

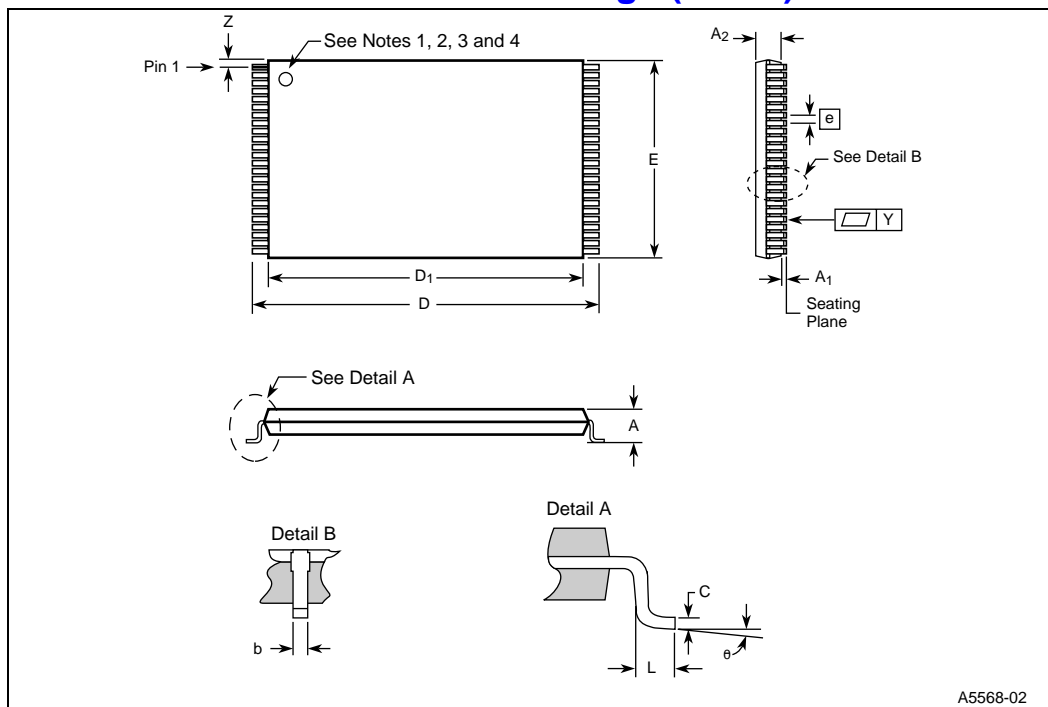


Family: Thin Small Out-Line Package								
Symbol	Millimeters			Notes	Inches			Notes
	Min	Nom	Max		Min	Nom	Max	
A			1.200				0.047	
A <sub>1</sub>	0.050				0.002			
A <sub>2</sub>	0.965	0.995	1.025		0.038	0.039	0.040	
b	0.150	0.200	0.300		0.006	0.008	0.012	
c	0.115	0.125	0.135		0.0045	0.0049	0.0053	
D	19.800	20.00	20.200		0.780	0.787	0.795	
D <sub>1</sub>	18.200	18.400	18.600	4	0.717	0.724	0.732	4
E	9.800	10.000	10.200	4	0.386	0.394	0.402	4
e		0.500				0.0197		
L	0.500	0.600	0.700		0.020	0.024	0.028	
N		40				40		
Ø	0°	3°	5°		0°	3°	5°	
Y			0.100				0.004	
Z	0.150	0.250	0.350		0.006	0.010	0.014	

**NOTES:**

1. One dimple on package denotes Pin 1.
2. If two dimples, then the larger dimple denotes Pin 1.
3. Pin 1 will always be in the upper left corner of the package, in reference to the product mark.
4. Package/Tray orientation: Package pin 1 will always be orientated towards the chamfer tray side (Dimension Z) as per JEDEC standard JEP-95, CS-008

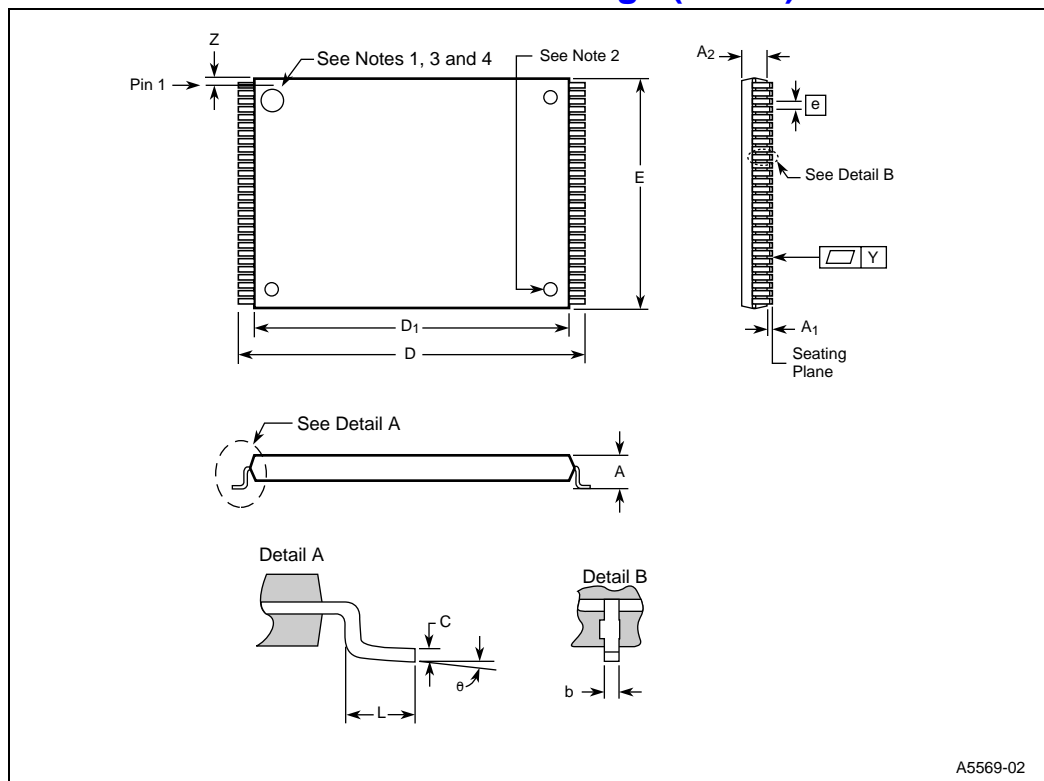
## 2.11.4 48-Lead Thin Small Out-line Package (TSOP)



A5568-02

Family: Thin Small Out-Line Package								
Symbol	Millimeters			Notes	Inches			Notes
	Min	Nom	Max		Min	Nom	Max	
A			1.200				0.047	
A <sub>1</sub>	0.050				0.002			
A <sub>2</sub>	0.950	1.000	1.050		0.037	0.039	0.041	
b	0.150	0.200	0.300		0.006	0.008	0.012	
c	0.100	0.150	0.200		0.004	0.006	0.008	
D	19.800	20.000	20.200		0.780	0.787	0.795	
D <sub>1</sub>	18.200	18.400	18.600	4	0.717	0.724	0.732	4
E	11.800	12.000	12.200	4	0.465	0.472	0.480	4
e		0.500				0.0197		
L	0.500	0.600	0.700		0.020	0.024	0.028	
N		48				48		
Ø	0°	3°	5°		0°	3°	5°	
Y			0.100				0.004	
Z	0.150	0.250	0.350		0.006	0.010	0.014	
<b>NOTES:</b> 1. One dimple on package denotes Pin 1. 2. If two dimples, then the larger dimple denotes Pin 1. 3. Pin 1 will always be in the upper left corner of the package, in reference to the product mark. 4. Package/Tray orientation: Package pin 1 will always be orientated towards the chamfer tray side (Dimension Z) as per JEDEC standard JEP-95, CS-008								

## 2.11.5 56-Lead Thin Small Out-line Package (TSOP)



Family: Thin Small Out-Line Package								
Symbol	Millimeters			Notes	Inches			Notes
	Min	Nom	Max		Min	Nom	Max	
A			1.200				0.047	
A <sub>1</sub>	0.050				0.002			
A <sub>2</sub>	0.965	0.995	1.025		0.038	0.039	0.040	
b	0.150	0.200	0.300		0.006	0.008	0.012	
c	0.115	0.125	0.135		0.0045	0.0049	0.0053	
D	19.800	20.00	20.200		0.780	0.787	0.795	
D <sub>1</sub>	18.200	18.400	18.600	4	0.717	0.724	0.732	4
E	13.800	14.000	14.200	4	0.543	0.551	0.559	4
e		0.500				0.0197		
L	0.500	0.600	0.700		0.020	0.024	0.028	
N		40				40		
Ø	0°	3°	5°		0°	3°	5°	
Y			0.100				0.004	
Z	0.150	0.250	0.350		0.006	0.010	0.014	

### NOTES:

- One dimple on package denotes Pin 1.
- If two dimples, then the larger dimple denotes Pin 1.
- Pin 1 will always be in the upper left corner of the package, in reference to the product mark.
- Package/Tray orientation: Package pin 1 will always be orientated towards the chamfer tray side (Dimension Z) as per JEDEC standard JEP-95, CS-008



## **2.12 Pinned Packages**

### **2.12.1 Plastic Pin Grid Array (PPGA)**

For package drawings and dimensions of the PPGA package please refer to Chapter 13.

### **2.12.2 Micro Pin Grid Array ( $\mu$ PGA)**

For package drawings and dimensions of the  $\mu$ PGA package please refer to Chapter 13.

### **2.12.3 Flip Chip PGA (FC-PGA)**

For package drawings and dimensions of the FC-PGA package please refer to Chapter 13.

## **2.13 Ball Grid Array Packages**

### **2.13.1 Plastic Ball Grid Array (PBGA)**

For package drawings and dimensions of the PBGA package please refer to Chapter 14.

### **2.13.2 Organic Land Grid Array (OLGA)**

For package drawings and dimensions of the OLGA package please refer to Chapter 14.

## **2.14 Chip Scale Packages (CSP)**

### **2.14.1 Micro Ball Grid Array ( $\mu$ BGA)**

For package drawings and dimensions of the OLGA package please refer to Chapter 15.

### **2.14.2 Easy BGA**

For package drawings and dimensions of the Easy BGA package please refer to Chapter 15.

### **2.14.3 Intel® Stacked CSP**

For package drawings and dimensions of the Easy BGA package please refer to Chapter 15.

### **2.14.4 Molded Matrix Array Package (MMA)**

For package drawings and dimensions of the Easy BGA package please refer to Chapter 15.

## 2.15 Cartridge Packaging

### 2.15.1 Single Edge Contact Cartridge (S.E.C.C.)

For package drawings and dimensions of the S.E.C.C. package please refer to Chapter 16.

### 2.15.2 Single Edge Processor Package (S.E.P.P.)

For package drawings and dimensions of the S.E.P.P. package please refer to Chapter 16.

### 2.15.3 Mobile Mini-Cartridge

For package drawings and dimensions of the Mobile Mini-Cartridge package please refer to Chapter 16.

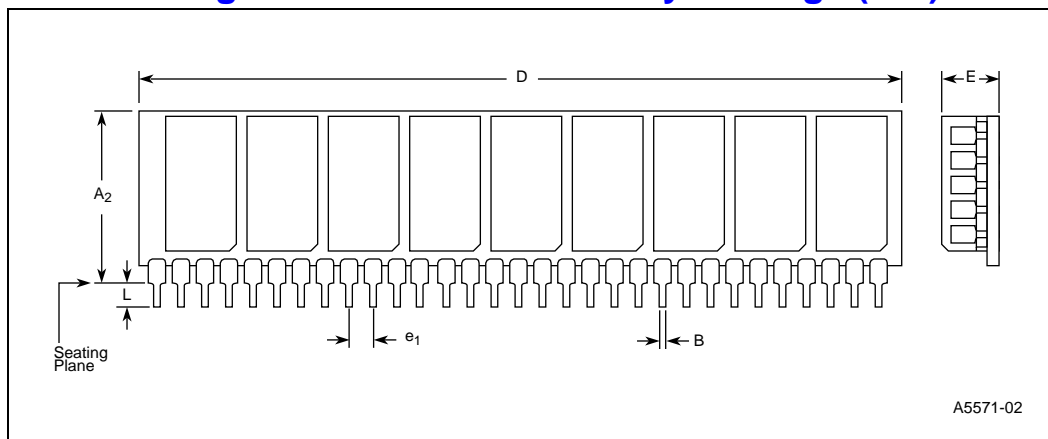
## 2.16 Single In-line Leaded Memory Module Package (SIP)

### 2.16.1 Symbol List for Single In-Line Leaded Memory Module Family

Letter or Symbol	Description of Dimensions
A <sub>2</sub>	Overall Height
B	Width of Terminal Leads
C	Thickness of Terminal Leads
D	Largest Overall Package Dimension of Length
E	Largest Overall Package Width Dimension Outside of Leads
e <sub>1</sub>	Linear Spacing between Centerline of body Terminal Leads (Standoffs)
L	Distance from Seating Plane to End of Lead

Packaging Family Attributes	
Category	Single In-Line Leaded Package
Acronym	SIP
Lead Configuration	Single Row
Lead Counts	30
Lead Finish	Tin/Nickel
Lead Pitch	2.5mm
Board Assembly Type	Socket and Insertion Mount

## 2.16.2 30-Lead Single In-line Leded Memory Package (SIP)



Family: Small In-Line Leded Memory Module (SIP)						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
$A_2$	16.43	16.59		0.647	0.653	
B	0.557	0.559		0.018	0.022	
C	0.229	0.279		0.009	0.011	
D	78.61	78.87		3.095	3.105	
E		5.08			0.200	
$e_1$	2.54			0.110		
L	3.18		Typical	0.125		Typical
N	30			30		

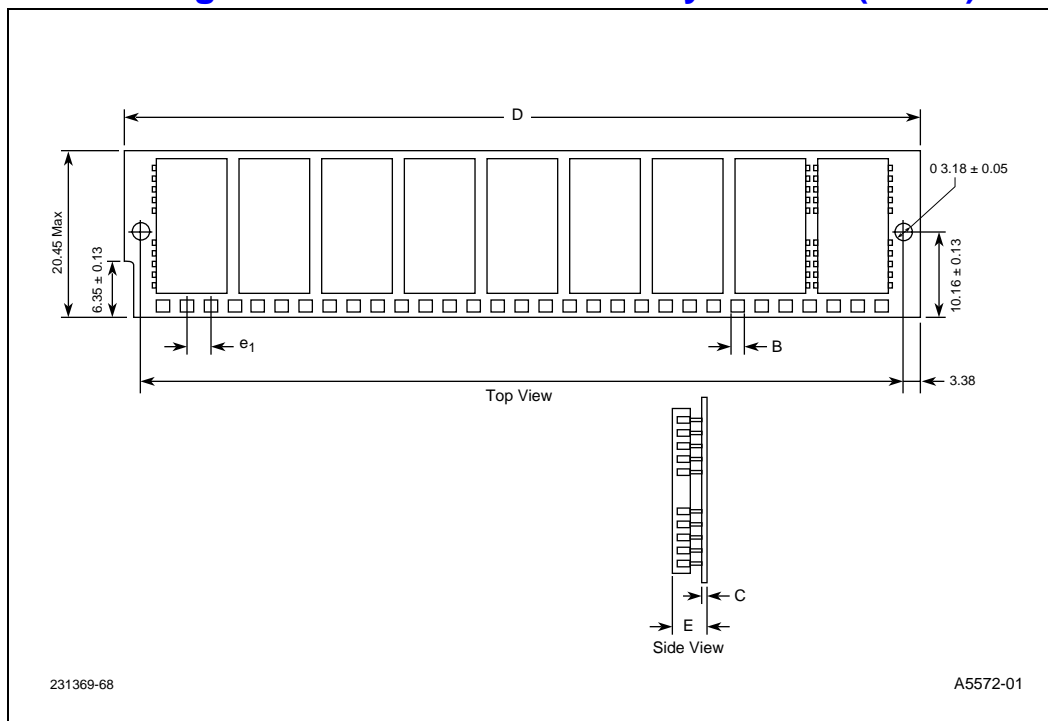
## 2.17 Single In-line Leadless Memory Module (SIMM)

### 2.17.1 Symbol List for Single In-Line Leadless Memory Module Family

Letter or Symbol	Description of Dimensions
B	Width of Terminal Pads
C	Thickness of Terminal Pads
D	Largest Overall Package Dimension of Length
E	Largest Overall Package Width Dimension Outside of Pads
e <sub>1</sub>	Linear Spacing between Centerline of body Terminal Pads(Standoffs)
N	Total Number of Potentially Usable Lead Positions

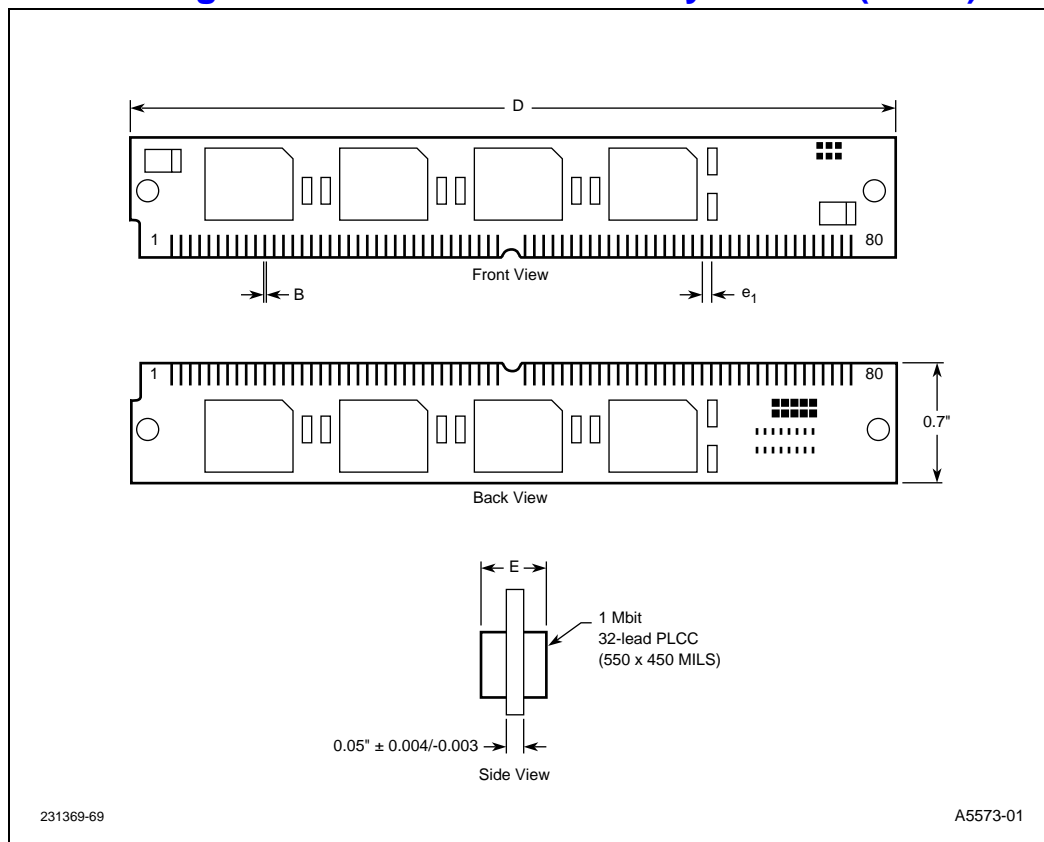
Packaging Family Attributes	
Category	Single In-Line Leadless Memory Module
Acronym	SIMM
Lead Configuration	Single Row
Lead Counts	30, 80
Lead Finish	Solder Coat
Lead Pitch	0.100"
Board Assembly Type	Socket and Insertion Mount

## 2.17.2 30 Pad Single In-Line Leadless Memory Module (SIMM)



Family: Single In-Line Leadless Memory Module						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
B	1.78		Typical	0.070		Typical
C	1.19	1.40		0.047	0.055	
D	88.77	89.03		3.495	3.505	
E		5.08			0.200	
e <sub>1</sub>	2.54		Typical	0.100		Typical
N	30			30		

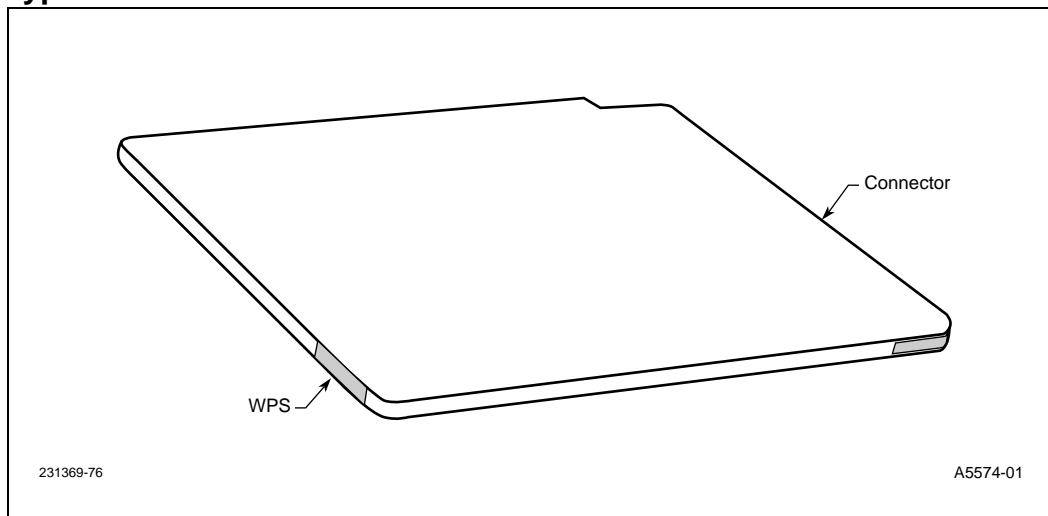
### 2.17.3 80 Pad Single In-Line Leadless Memory Module (SIMM)



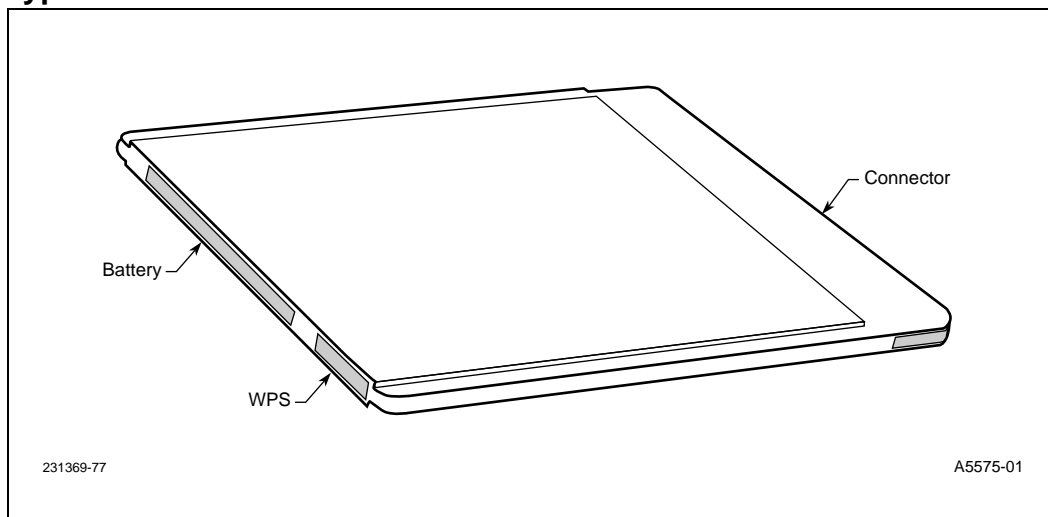
Family: Single In-Line Leadless Memory Module						
Symbol	Millimeters			Inches		
	Min	Max	Notes	Min	Max	Notes
B	1.04		Typical	0.041		Typical
C	1.19	1.37		0.047	0.054	
D	117.98	118.24		4.645	4.655	
E	8.38			0.33		
$e_1$	1.27		Typical	0.050		
N	80			80		Typical

## 2.17.4 PCMCIA PC Card Type I and Type II

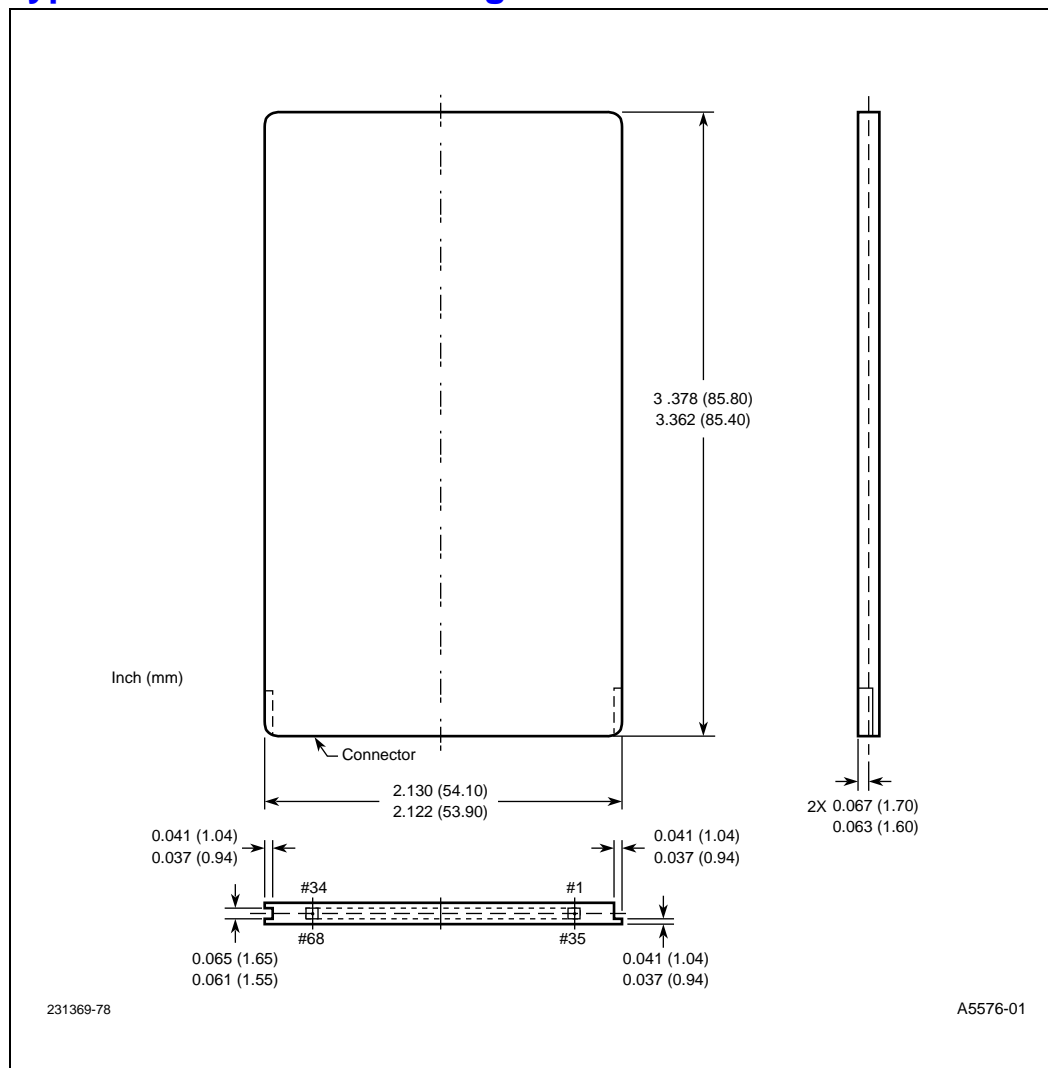
### 2.17.4.1 Type I



### 2.17.4.2 Type II

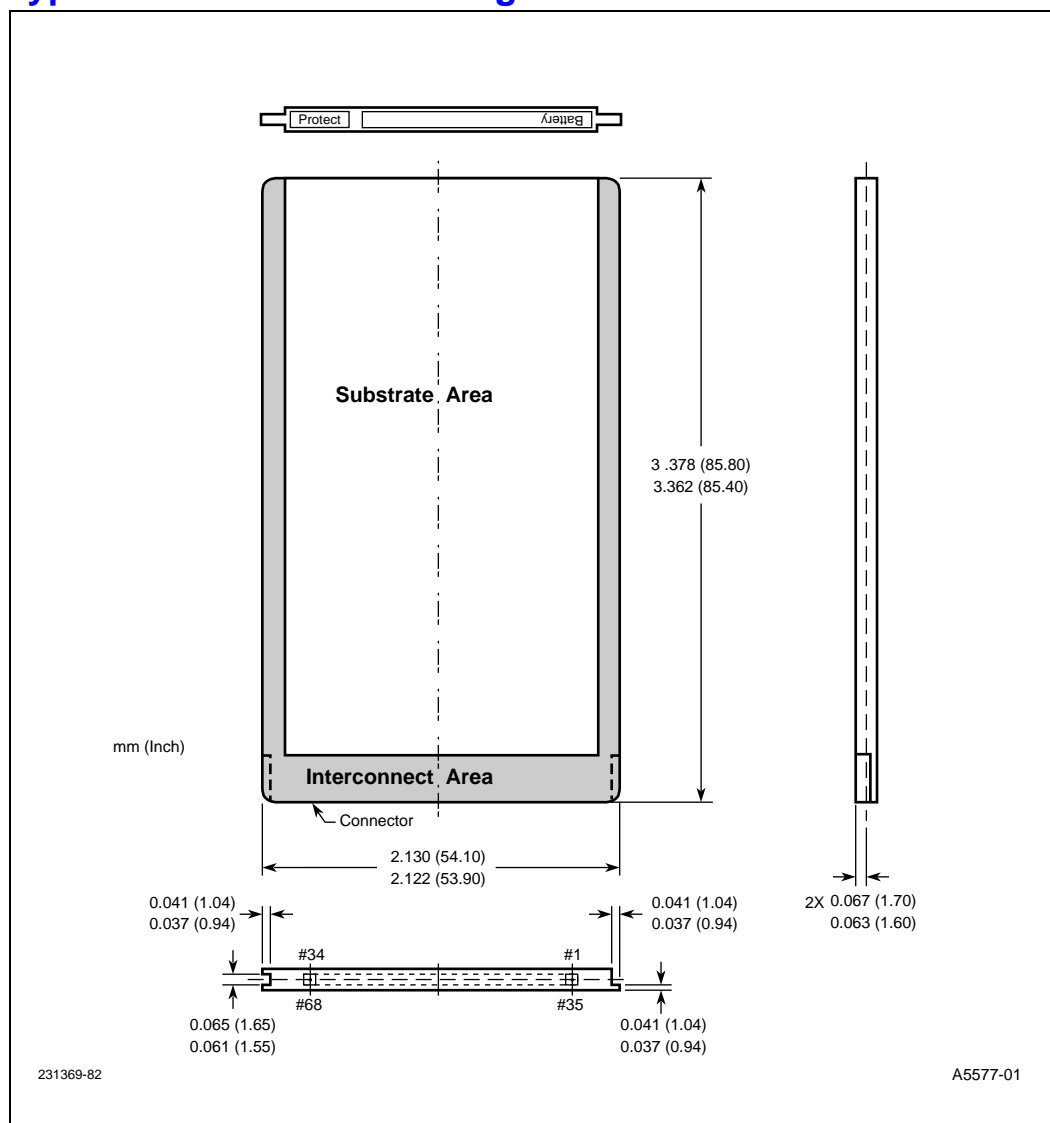


## 2.17.5 Type I PCMCIA Card Package Dimensions





### 2.17.6 Type II PCMCIA Card Package Dimensions



## 2.17.7 PCMCIA Card Physical Dimensions

	Length	Width	Interconnect Area <sup>(1)</sup>	Substrate Area <sup>(1)</sup>
Type I	3.370 ± 0.008 (8.56 ± 0.20)	2.126 ± 0.004 (54.0 ± 0.10)	0.65 ± 0.002 (1.65 ± 0.06)	0.65 ± 0.002 (1.65 ± 0.06)
Type II	± 0.008 (85.6 ± 0.20)	2.126 ± 0.004 (54.0 ± 0.10)	.065 ± 0.002 (1.65 ± 0.06)	0.098 <sub>MAX</sub> (2.5)

**NOTES:**

1. Interconnect area and substrate area thickness are specified from the IC memory card center line to either the top or bottom surface.
2. Millimeters are in parentheses ( ); otherwise inches.

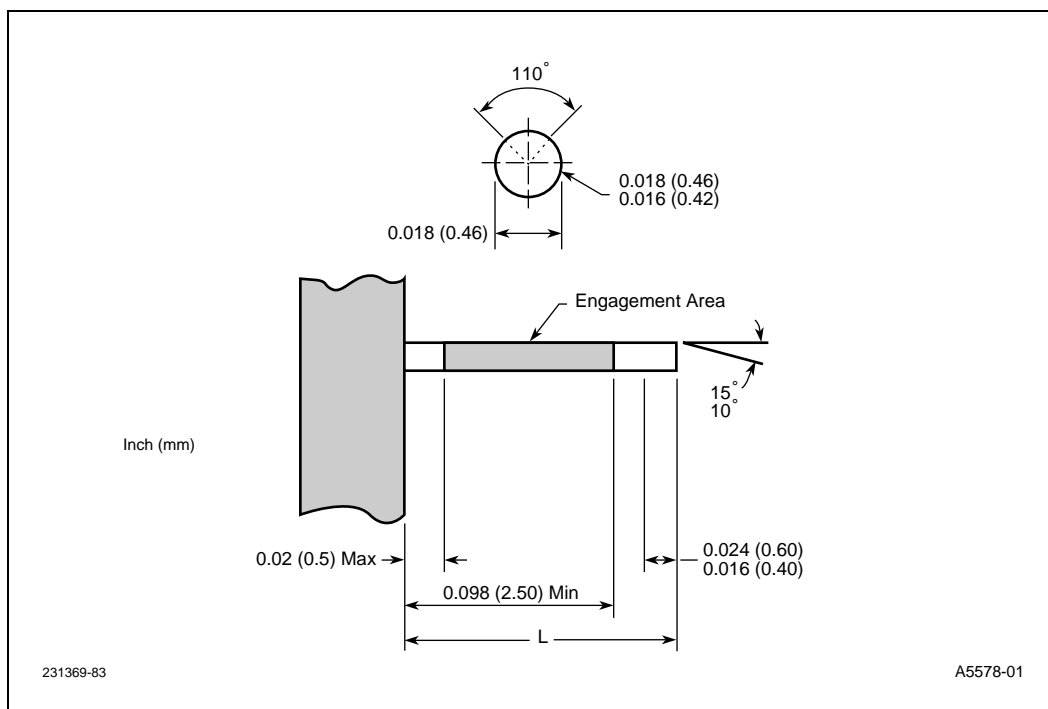
## 2.17.8 Host Connector Pin Configuration for Both Type I and Type II

Pin Type	Pin Length (L)	Pin #
Detect	(3.6) 0.134 (3.4)	36, 67
General	(4.35) 0.163 (4.15)	All Other Pins
Power	(5.1) 0.193 (4.9)	1, 17, 34, 35, 51, 68

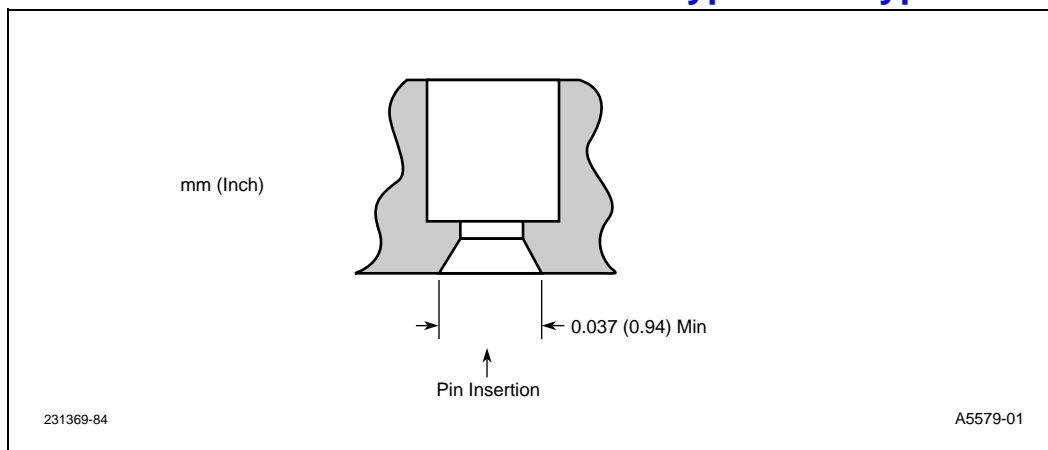
**NOTES:**

1. Millimeters are in parentheses ( ); otherwise inches.

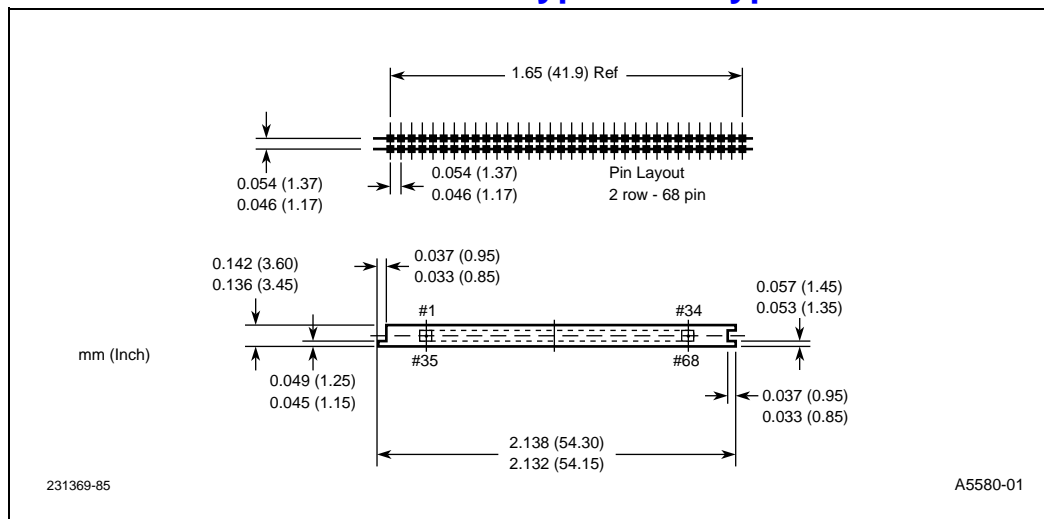
## 2.17.9 Host Connector Pin Configuration for Both Type I and Type II



## 2.17.10 PCMCIA Card Connection Socket for Type I and Type II



### 2.17.11 PCMCIA Card Connector for Type I and Type II



## 2.18 Revision Summary

- General review of chapter
- Removed packages no longer being used by Intel